

# FLIGHT

The  
AIRCRAFT ENGINEER  
AND AIRSHIPS

First Aeronautical Weekly in the World. Founded January, 1909

Founder and Editor: STANLEY SPOONER

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## DIARY OF CURRENT AND FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in this list:—

1932.

- Nov. 25. Norfolk and Norwich Ae.C. Annual Ball.
- Nov. 26. Comrades of the R.A.F. Re-union Dinner, Harrods'.
- Dec. 1. "The Behaviour of Fluids in Turbulent Motion." Lecture by Mr. A. Fage, A.R.C.Sc., F.R.Ae.S., before R.Ae.S.
- Dec. 2. Hampshire Ae.C. Annual Dinner and Dance.
- Dec. 2. Yorkshire Ae.C. Annual Dance, Hotel Majestic, Harrogate.
- Dec. 3. De Havilland Works Annual Dinner, at the Wharnccliffe Rooms.
- Dec. 4. Close of Paris Aero Show.
- Dec. 5. Hull Flying Club Annual Ball.
- Dec. 6. Junior Ae.C. Annual Dinner at Ye Olde Ham Bone Clubbe, Ham Yard, Great Windmill Street, W.
- Dec. 8. "Air Survey." Lecture by Lieut. J. S. A. Salt, R.E., before R.Ae.S.
- Dec. 10. Maidstone Ae.C. Annual Dance.
- Dec. 14. "Air Power and Disarmament." Lecture by Group Capt. J. T. Babington, before R.U.S.I.
- Dec. 14. London Ae.C. Annual Dinner and Dance, at Park Lane Hotel.
- Dec. 15. "Lessons of the D.O.X." Lecture by Dr. C. Dornier, before R.Ae.S.
- Dec. 16. College of Aeronautical Engineering Annual Dinner, and Dance, Park Lane Hotel.
- Dec. 23. Liverpool and Dis. Ae.C. Annual Dance at Mostyn House School.

1933.

- Jan. 6. Bristol and Wessex Ae.C. Dance, at Grand Spa Hotel.
- Jan. 6. No. 25 (F.) Sqdn., R.A.F., Re-union Dinner at May Fair Hotel.
- Jan. 11. B.G.A. Ball in Honour of Mrs. Mollison, at Portman Rooms.
- Jan. 12. "Airship Development Abroad." Lecture by Sqdn.-Ldr. R. S. Booth, before R.Ae.S.
- Feb. 1. "Recent Operations in Kurdistan." Lecture by Group-Capt. A. G. R. Garrod, before R.U.S.I.

## THE "AIRCRAFT ENGINEER"

Owing to pressure on our space this week, in connection with the Paris Aero Show, etc., this month's "Aircraft Engineer" is held over until next week's issue of FLIGHT—Dec. 1st.

## EDITORIAL COMMENT



WHEN Mr. Baldwin, presumably speaking for His Majesty's Government, said that he did not believe that disarmament would stop war, but only make it more difficult for a nation to begin war, it really almost seemed that the British might cease to waste time at Geneva in futile attempts to achieve disarmament. None the less, Sir John Simon, also speaking for the Government, has now laid certain British proposals before the Bureau of the Disarmament Conference.

### The British at Geneva

As regards the air, saving the civil population from aerial bombardment has been laid down as the main objective. To achieve this the best way of proceeding, it is stated, is to abolish all naval and military aircraft except those needed for police purposes in outlying places. But this by itself would, it is admitted, be useless, because civil aircraft may be used to drop bombs. Therefore there must be "an effective international control of civil aviation." The whole question boils down to that. If effective international control of civil aircraft and civil flying is possible, then air disarmament is possible. If the former is impossible, then the latter is impossible.

Sir John Simon went on to propose that as a first measure, an attempt presumably just to make war more difficult, all nations should reduce their air forces to the size of the British Air Force, and then that all, including ourselves, should make a cut of 33½ per cent. If all the others will agree, and especially if Russia not only agrees but submits to effective international inspection to assure that this has been carried out, we should certainly be

the last to raise any objections. On Thursday last Lord Apsley asked the Prime Minister how Russia stood with regard to any disarmament proposals, and Mr. MacDonald replied that in the proposals of His Majesty's Government Russia was obviously included. So here we find another crucial point. If Russia will not disarm her Red Air Force to the level of two-thirds of what the British Air Force is now, this proposal will also fall to the ground.

Both these "IFs," however, are very big. It is not exactly likely that either France or Italy would feel happy in agreeing to reduce their Air Forces to the British level and then again by a third, but if they agreed, the chance of Soviet Russia likewise conforming appears to us so very remote that it is hardly worth consideration. The other condition, namely the international control of civil flying, is more insidious. It is, however, not a concrete proposal. Mr. Baldwin in his recent speech replied to the protest of the air group of which Capt. Guest is spokesman, by saying "It is all very well using the phrase 'international control,' but nobody knows quite what it means, and the subject has never been investigated." Sir John Simon said that the difficulties were evidently very great, but that His Majesty's Government were anxious to co-operate with the other chief air Powers in a thorough examination into the practicability of such a scheme. That thorough examination is, we think, not unlikely to take a fairly long time!

For ourselves we can conceive no solution to the difficulties of "effective international control" of civil flying, and any attempt which seems possible can hardly be anything but pernicious in its effect on the development of air transport. It is certainly a question whether a hampering of commercial flying would not be a greater evil to the world than a failure, not—mark you—to prevent war, but to make war "more difficult." We British must certainly think of our own interests. We may have been slow in starting our air lines across the British Empire, but in time we shall fully develop them, and no Power in the world stands to gain more from air transport than the British Empire stands to gain. We have taken the lead in various forms of aircraft design, light aeroplanes and flying boats for example, and we for our part must protest most vigorously against anything which would hamper our development in the way that international control would do. That foreign inspectors should have the right to examine the details of the design of our machines in order to decide whether they could easily be converted into bombers, would be an utterly intolerable

state of affairs. So too would be any international restrictions on new British air lines and upon the numbers of privately-owned British aircraft. We cannot imagine any nation which has an air sense submitting to such restrictions, and so, unless our imaginings are very much astray, this condition will prove impossible to fulfil. On both the grounds mentioned above, we believe that the British proposals so solemnly laid before the Conference by Sir John Simon will come to naught.

There is, none the less, one definite danger. Great Britain, under various Governments, has set what is called a very good example in the way of unilateral disarmament. Our programme for air defence was approved in 1923 if we remember aright, and its completion has been postponed many times. The National Government has said that enough has been done on the unilateral principle; but what will the next Government say? If we dispense with our fighter squadrons, we shall certainly make war more difficult—for ourselves. We shall be at the mercy of any assailant, and shall probably have to submit without fighting.

The British proposals do not affect the use of an Air Force "for police purposes in outlying places." That, presumably, means that our squadrons overseas will not be affected, and may even be increased, even if the plan were to become effective. Our flying boats would certainly have to be free to increase in size and

range, and no restrictions of weight or anything like that would be placed upon them. Would not other nations suspect us of perfidious intentions to bomb them with our flying boats?

❖   ❖   ❖   ❖

Mrs. Amy Mollison, in her great Cape flight, has shown a degree of stamina which would be thought incredible in a woman if the facts did not prove it to exist. From the stamina point of view, this flight is perhaps the most remarkable that has ever been made. To her we offer hearty congratulations.

Furthermore, the De Havilland "Gipsy Major" engine has now won its golden spurs with a vengeance, while the D.H. "Puss Moth" has once again showed its quality for long-distance flights. We have ceased to wonder at the capacity of the "Moth" and the "Puss Moth" for flying on day after day, and now we might almost add night after night, with a heavy load of petrol; but when a new type of engine is called upon for the first time to keep "revving" in the same continuous way, that lends a special interest to a flight. The De Havilland firm deserves the heartiest congratulations.



Sir John D. Siddeley, C.B.E., from the painting by Mr. F. O. Salisbury, at the exhibition of the Royal Society of Portrait Painters.





# THE PARIS AERO SHOW

**F**OLLOWING well-established custom, the President of the French Republic opened the 13th International Aero Exhibition by making a tour of inspection of the Grand Palais des Champs-Élysées on Friday last, November 18. For two hours the President and his entourage proceeded from stand to stand, and precisely as the famous clock in the building struck twelve, the National Guard stood to attention and M. le President and his advisers took their departure, and the thirteenth of the aero shows to be held in Paris was opened to the general public.

The President was shown around by M. Henry Potez, who is this year chairman of the *Chambre Syndicale*, the French equivalent of our Society of British Aircraft Constructors. During his tour of the Grand Palais the President did not fail to pay visits to the British stands, on which he stopped to inspect and, one felt, admire, the British products exhibited. With so many stands demanding his attention, it was not to be expected that the President would linger very long, but certainly he did not spend less time on the British stands than on many of the French, a fact which was a cause of satisfaction to the British exhibitors.

Thirteen is traditionally an "unlucky" number, and superstitious people will doubtless derive considerable satisfaction from the admittedly somewhat disappointing character of this year's show. The freakish aircraft has entirely disappeared, and none will lament its demise. But

of real solid progress there is, if the truth must be told, small trace among the efforts to be found on the stands.

Few will deny that structurally Great Britain has progressed farther than most countries. High tensile steels used effectively and economically (from a strength/weight point of view) characterise the British exhibits. The latest use of stainless steels, as seen on the Hawker fuselage skeleton and on the Bristol "Bulldog" wing, is for sheer practical utility far ahead of anything to be found on any other stand in the Grand Palais. When one comes to skin coverings, however, French constructors appear to be holding their own. In this country we are not overlooking the possibilities which may be found in the substitution of metal for fabric, but the stressing of metal panels is not as yet an exact science, and, true to the British method of carrying out stress analysis, we do not feel happy about the metal skin until we are convinced that we can estimate the stresses in it with reasonable accuracy. If all goes well, it will not be very long before the necessary data have been accumulated, but in the meantime we are largely steering clear of metal skins, except for flying boat hulls, of which British constructors have now had long experience, which is able to guide them to reasonable weights without weak spots coming to light during subsequent service.

French designers, on the other hand, have ever relied on loading tests rather than on calculations, and it is doubtless this difference which has led them to go ahead more



THE THIRTEENTH INTERNATIONAL AERO SHOW AT PARIS: In the foreground of this general view are the Morane-Saulnier machines. The large monoplane behind them is the Latécoere Lat. 290.



**THE ARMSTRONG-SIDDELEY RANGE :** In this view of the stand the "Panther" is on the left, the "Lynx" in the background, the 7-cylinder "Genet Major" in the centre, the "Leopard" to the right of that, and the "Double Mongoose" on the extreme right.

rapidly than we with the use of metal (Duralumin) skin coverings.

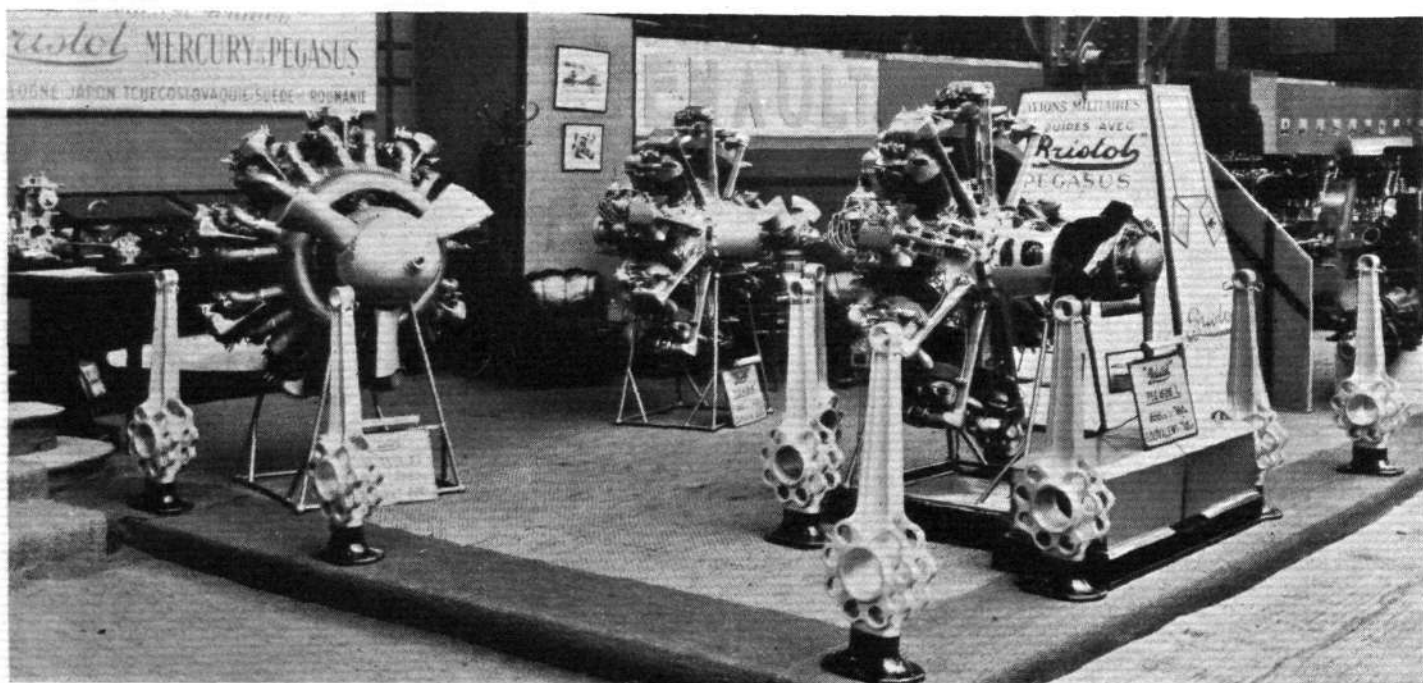
A very marked change has taken place at this year's show in the method of using metal for covering. In previous years corrugated sheet, of what may be termed the Junkers type, has been used extensively. This year not a single example of this type of skin is to be seen. The great majority of wing and fuselage coverings are either in the form of quite flat panels or strips, or else show very minute corrugations. A third form of skin frequently seen is flat sheet with spaced corrugations, rather like that used by Saunders-Roe for flying boat hulls. It is not our intention here to enter into explanations of the reason for this disappearance of the deeply-corrugated skin. That is a problem with which doubtless Mr. H. J. Pollard will deal in the article he is preparing for us on metal construction at the Paris Show. We merely put on record the fact that flat skins are the fashion with French constructors this year.

On the aerodynamic side, the show bears little testimony to any serious attempt at improvement. From previous experience, one went to Paris expecting to find a number of machines with retractable undercarriages. One found two, of which one was on the Blériot 111 previously exhibited; the other was on a small twin-float seaplane, on which the wheels disappeared into the floats. For the rest, aerodynamic design appears to have come to a stand-

still. The strut-braced monoplane and the cantilever appear about equally divided. But definitely the monoplane holds the field. Put into figures, the tendency among French constructors may be gauged from the fact that out of a total of 46 aircraft 33 are civil types and 13 military. These are again subdivided as follows: Among the military types there are 8 monoplanes and 5 biplanes. Among the civil types, the biplane has all but disappeared, only two being exhibited. One of these is the Blériot small flying boat, which is a sesquiplane, and the other the Caudron "Luciole," a small machine for training and for the private owner. The monoplanes number 31! Thus we arrive, among the French machines, at 39 monoplanes and seven biplanes.

If the foreign (i.e., non-French) machines are included, the proportion is not appreciably altered, since the Italian machines are approximately evenly divided, while the three Polish monoplanes offset the three British biplanes.

The disarmament question is on everyone's tongue, and the disarming ingenuousness with which many constructors have omitted armaments from their machines to give them a less warlike appearance is not without its humour. On one stand we were solemnly assured that the machine was a purely civil type, and that certain unusual arrangements were done for the sake of the passengers, the machine being intended for colonial use. Unfortunately, elsewhere, a photograph of the same machine was discovered in



**THE BRISTOL ENGINE STAND :** The sectioned "Pegasus" is in the foreground and the "Mercury" on the left.





THE 1933 "BULLDOG": Behind it on the Bristol stand is a skeleton wing in stainless steel.

which a machine gun mounted on a Scarff gun ring was one of the attractions! Curiously enough, "Perfidious Albion" has made no attempt to disguise the military character of the machines. The Bristol, Fairey and Hawker aircraft are frankly aggressive and business-like in their appearance, flaunting their guns and bombs unashamed. But on the whole, and counting as military even such machines as have been peacefully disguised, the 1932 Paris Aero Show is quite definitely of a civil character.

#### Great Britain at the Show

As announced in *FLIGHT* last week, four firms had arranged to exhibit aircraft: Bristol, Fairey, General Aircraft, and Hawker. The Monospar machine had not turned up when we left Paris, but of the reason for this we were ignorant. It now appears that the bad weather of the last few days delayed it. It has since arrived.

An excellent display is made by the Bristol Company, the aircraft stand containing a beautifully finished "Bulldog," 1933, type, a "Bulldog" wing in stainless steel, a number of samples of Bristol metal construction, and photographs of Bristol aircraft from the earliest days of flying to the present time.

On the engine stand adjoining the aircraft stand Bristols are showing three engines, a part-sectioned "Pegasus" L, a "Pegasus" S, and a "Mercury" S.2. The engines are very beautifully finished and are generally admired.

The two Fairey machines, a "Fox II" and a "Firefly II," both with Rolls-Royce "Kestrel" engines, are very highly finished, and it is interesting to find that the Belgian factories at Gosselies are certainly capable not only of good workmanship but also of a show finish equal to that of the British works. Many of the French constructors have taken the opportunity to examine the

Fairey machines, and not a few have expressed their admiration.

The "Fox II" has an increase in armament in that a second machine gun has been placed on the other side of the fuselage, the extra gun being, of course, operated by the pilot. The rear gun is, as usual, placed on the special Fairey mounting.

Next to the Fairey stand is that of the Hawker Company, where the complete aircraft shown is a "Hart" from No. 57 Squadron. This machine has done 740 hr. flying, yet certainly looks as if it had but recently left the factory. This fact speaks well not only of the original workmanship (and incidentally of the Cellon dope), but also of the care taken of its equipment by No. 57 Sqd.

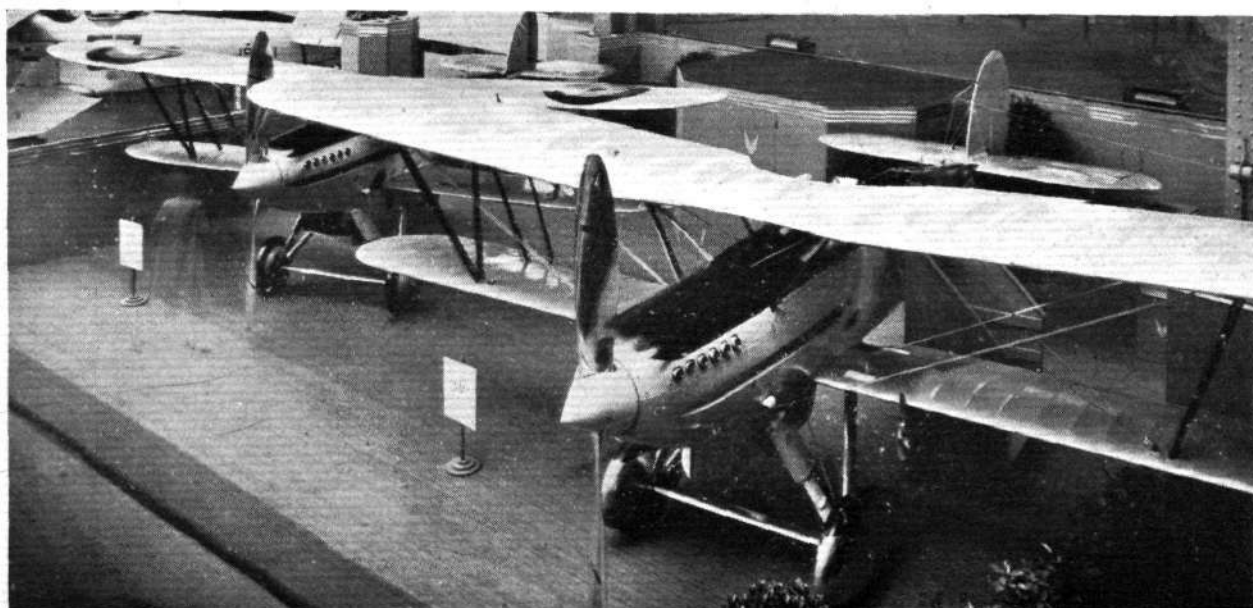
The "Osprey" fuselage in stainless steel, shown in skeleton, is one of the centres of attraction of the show, and is admired by expert and casual onlooker alike. We gather that the highly polished finish is not a mere show finish, but that production machines will have it also.

British aero engine firms are represented, in addition to the Bristol engines already mentioned, on British stands by Armstrong-Siddeley Motors, Ltd., and Rolls-Royce, Ltd., as well as by "Cirrus-Hermes" and "Gipsy" engines on French stands.

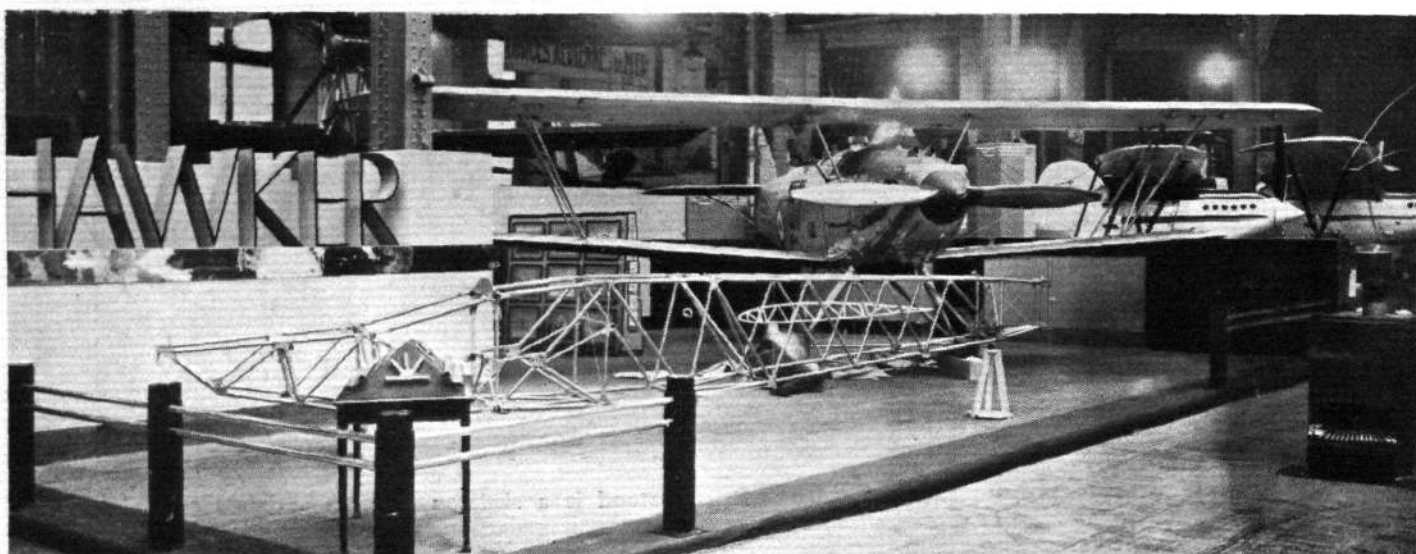
The Armstrong-Siddeley range exhibited includes a 7-cylinder "Genet Major," a "Lynx," a "Double Mon-goose," a "Panther," and a "Leopard."

On the Rolls-Royce stand are two engines, a part-sectioned "Kestrel" and a "Buzzard." Transparencies give a good idea of the wide range of aircraft types in which Rolls-Royce engines are fitted.

De Havilland engines are presented on a stand in the gallery by their French agents Société des Etablissements Emile Regnier, the types being a "Gipsy III" and a "Gipsy Major."



THE FAIREY MACHINES: In this view the wings of the "Fox" rather hide the "Firefly," but actually on the stand both machines are readily viewed, which, needless to say, means admired.



**THE HAWKER STAND :** On the right the "Hart" ("Kestrel") of No. 57 Squadron, which has done 740 hours' flying. In the foreground the stainless steel fuselage for the "Osprey," which is one of the greatest attractions of the Show.

A part-sectioned "Hermes" engine is to be seen on the S.A.F.A. aircraft stand, this engine being fitted as standard in the S.A.F.A. F.K.43 monoplane.

A walk round the gallery of the Grand Palais discloses the fact that British firms are quite well represented. A range of Lodge plugs is shown, while close by are the Palmer and Kirby-Smith stands. On the former one finds a complete series of Palmer wheels and wheel brakes, with a neat demonstration rig, which at first sight one is apt to take for an invalid's chair, but which on closer inspection is found to demonstrate the differential action of the Palmer brake.

The large range of instruments and K.L.G. plugs on the Kirby-Smith stand gives way in interest to the demonstration model of the automatic precession-corrector used in conjunction with the automatic pilot. Instead of the pilot or navigator having to correct at regular intervals for precession, this is done automatically by the associated compass, which ensures that as soon as the precession reaches a certain selected amount (which can be set to any degree of accuracy desired) the necessary correction is made. With this equipment the navigator is relieved of all duties except that of allowing for drift.

#### The French Exhibits

France's contribution to the exhibition amounts, as already stated, to no less than 46 machines. Space will not permit of referring in detail to these, but below we

give a brief outline of what is to be seen on the different firms' stands.

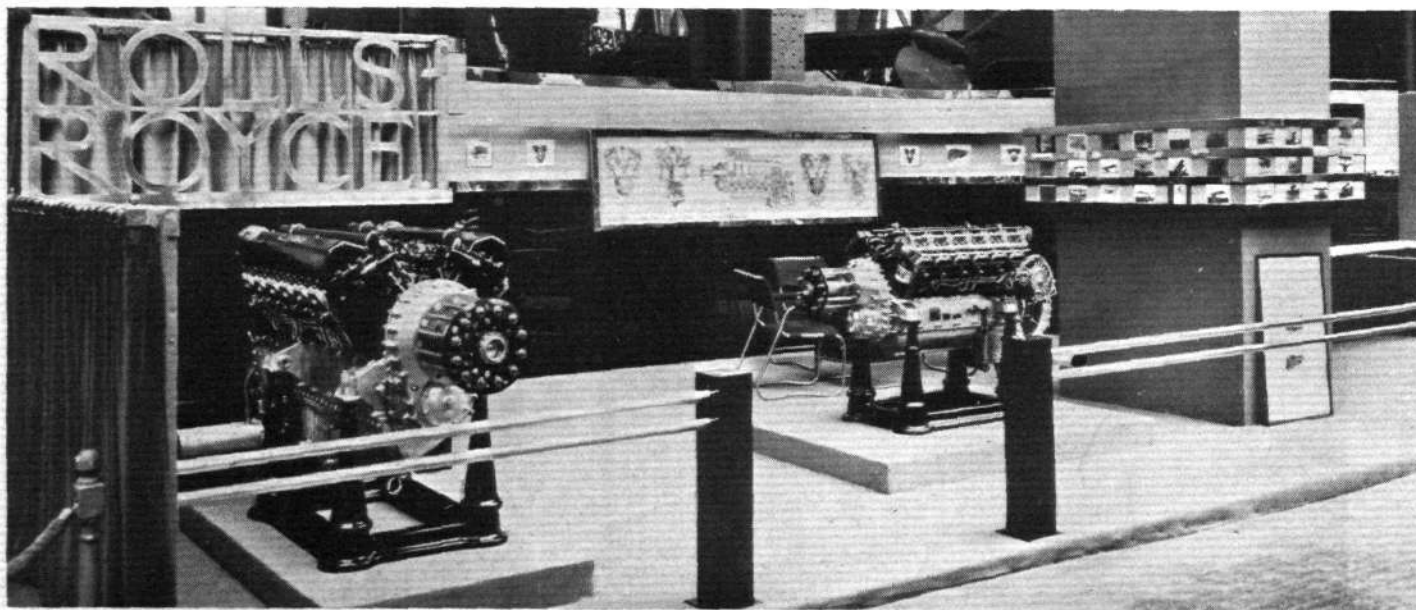
*A.N.F. Mureaux.*—Three complete aircraft are exhibited by this firm, all of metal construction (including covering), and all high-wing monoplanes. The 170 C.1 is a single-seater fighter, with wings having their maximum chord some little distance out, tapering to tips and root, and slightly bent as in the Polish P.Z.L. machines, but to a smaller extent. The engine is a Hispano-Suiza 12 Xbrs. Flat plate covering is used for wings and fuselage. The machine looks as if it ought to be very fast indeed, as it is carefully streamlined and has a very small wing area.

The 140T. is a six-seater light transport machine, fitted with three 120-h.p. Salmson engines. The flat skin covering of the fuselage is reinforced by external stringers of U section.

The third machine shown by this firm, the type 160-T, is a two-seater, side-by-side cabin monoplane of the "Desoutter" type, but is of all-metal construction, the wings as well as the fuselage being planked with flat Duralumin panels. The engine is a 95-h.p. "Renault."

*Adolphe Bernard.*—The Bernard 75 C.1 is a single-seater fighter of mixed construction. It is a low-wing monoplane fitted with Gnome-Rhone supercharged "Mistral" engine, and a N.A.C.A. cowling is employed. A speed of 350 km./hr. (217 m.p.h.) is claimed.

The second machine shown by Bernard is known as the type 200 TS., and is, like so many machines at the show



**DIGNIFIED SIMPLICITY :** The Rolls-Royce stand. On the left is a "Buzzard" and on the right a part-sectioned "Kestrel."





THE A.N.F. MUREAUX 170 C.1 : This is a single-seater fighter with "gull" shaped wings.

this year, of the "Puss Moth" type. Actually the 200 T.S. is a four-seater cantilever monoplane, and the cantilever principle has been extended even to the undercarriage, the "legs" of which are streamlined boxes having their inner ends projecting into the fuselage, where the shock absorbers are placed. The wing folding arrangement is very neat.

*Blériot-Aeronautique.*—Louis Blériot is represented this year by two machines only. One is the type 111, which has appeared before, the present example being the latest version. It is a single-engined low-wing monoplane fitted with 500-h.p. geared "Hispano" engine. Belonging to the small commercial class, the 111 is a cabin machine, and the Blériot retractable undercarriage, seen at former shows, is fitted. The water-cooling system includes wing leading-edge radiators, which take the form of D-section tubes of copper. As the machine has a nose radiator, the need for the wing radiator, at least of such size, is not obvious. A speed of 255 km./h. (150 m.p.h.) is claimed for the machine.

The second machine shown by Blériot is a small amphibian flying boat, intended for the private owner. It is a sesquiplane, powered by a 230-h.p. "Salmson" engine, mounted as a pusher, and the small bottom plane is so close to the water that the wing-tip floats are mounted direct, *i.e.*, without struts.

*Marcel Bloch.*—Among those French constructors who have realised the merits of the De Havilland "Puss Moth" and have produced machines along similar lines is evidently Marcel Bloch, who is showing two monoplanes of the

high-wing type, or, rather, one complete machine and the fuselage of another.

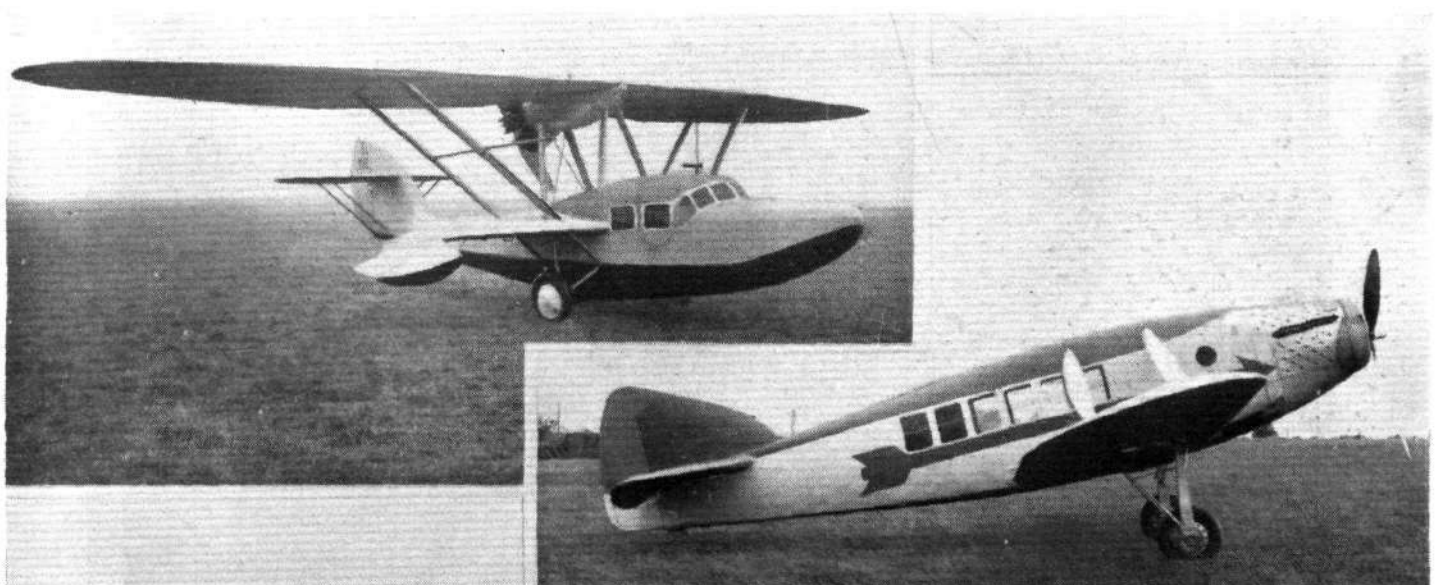
The Marcel Bloch type 91 is a side-by-side two-seater, while the type 92 has a narrower fuselage and the seats arranged one behind the other. Both types are fitted with the new inverted "Renault" engine of 120 h.p.

A third machine, the type 80, is an ambulance low-wing monoplane, in which the covering of wing as well as fuselage is of the flat-skin type. The engine is a "Salmson" 9 NC of 135 h.p.

*Louis Bréguet.*—Restraint is the keynote on the Bréguet stand this year. But a single machine is shown, this being the type 270 A.2 No. 11. This, apparently, is the "Tout Acier" fully developed, and with a "Hispano" 12 Ybrs. engine and certain modifications to the structure, the gross weight has been increased to 3 600 kg. (7,920 lb.). A speed of 310 km./hr. (192 m.p.h.) at 5 000 m. (16,400 ft.) is claimed.

*C.A.M.S.*—The Chantiers Aero-Maritimes de la Seine (one of the S.G.A. group) exhibit the C.A.M.S. 55-6, which is a reconnaissance and bombing biplane flying boat fitted with "Jupiter" engines in tandem. The machine is of all-metal construction, with a duralumin-planked hull of the two-step type. The steps appear close together, and the angles more pronounced than one finds on British flying boats. For a gross weight of 6 600 kg. (14,500 lb.) a speed of 200 km./hr. (124 m.p.h.) is claimed.

*Rene Caudron.*—Of the three machines exhibited by the Caudron firm, two are new types. The exception is the "Luciole" light two-seater biplane school and touring



TWO BLÉRIOT MACHINES : The upper photograph shows the 290 amphibian flying boat, and the lower the 111 commercial machine with retractable undercarriage.



**HETEROGENEITY :** The machine in the foreground of this general view is the Caudron P.V.200.

machine, which has been in existence for a long time.

The Caudron C.282 "Super-Phalene" is a high-wing monoplane of the "Puss Moth" class, but is a four-seater, although the accommodation appears a little cramped. A variable wing camber-cum tail trimming gear is employed, but as the machine has not yet been flown, it is not certain how it will work. The engine is an inverted "Renault" of 120 h.p.

The P.V.200 is built under licence from M. P. de Vizcaya, and is of very unorthodox conception. It is an amphibian twin-float monoplane, with the engine mounted in a very narrow streamline casing on top of the wing. The occupants sit side by side in a small cabin and probably get a very good view. The bottom of the fuselage is about level with the top of the floats, so that spray is apt to be considerable. The wheels retract into the bottom of the floats, which thereby lose the buoyancy of the middle (and therefore greater) portion.

*Couzinet.*—Rene Couzinet is exhibiting the type 33 (three "Gipsy III" engines), in which a fine flight was made some time ago from France to New Caledonia. An unusual feature of all Couzinet machines is the absence

of a tail fin in the ordinary sense of the word. Instead of a built-on fin, Couzinet flattens out his fuselage to form the fin. Perhaps the scheme may best be described by saying that the fuselage is a tube of three-ply wood, which has been flattened out towards the tail end. It seems quite likely that this shape may be effective in preventing spinning.

In addition to the complete machine Couzinet also exhibits the fuselage of his type 100, a four-passenger machine of generally similar lines, but fitted with three 45-h.p. "Salmson" engines.

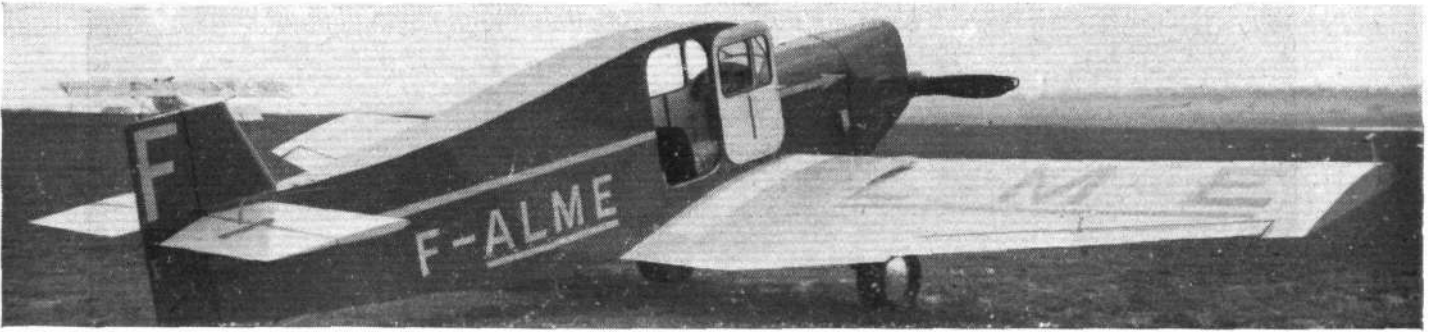
*Dewoitine.*—A departure has been made this year by Dewoitine, who is showing but a single machine, and that a racing seaplane. Of all-metal construction, including covering of wing and fuselage, this is a monoplane of the type made familiar by the Schneider Trophy racers. No radiator was visible, but it is assumed that the wing covering hides a surface radiator of some kind.

*Farman.*—This year the Farman Brothers, Henry, Maurice and Dick, have concentrated at the show on civil types, of which four are exhibited. Three of these are light planes, and the fourth a nearly-light plane.



**THE C.A.M.S. (S.G.A.) 55 :** The hull is of all-metal construction, with Duralumin planking





CONDUITE INTERIEURE : The Farman F.355 is a two-seater light plane with "Renault" engine.

The F.400 may be described as Farman's version of the "Puss Moth." It is a three-seater cantilever monoplane fitted with the 120-h.p. inverted Renault engine. The axle and radius rod of the undercarriage are faired together as a covered triangle, and the telescopic strut has also a very wide fairing.

A very small low-wing cantilever monoplane open two-seater, the type 360 is also shown. It has ply-covered fuselage and wings and looks very pretty painted in dark green cellulose lacquer. The engine is a Salmson 9 AD-R., which is the older engine with propeller reduction gear added. It is rated at 60 b.h.p.

Most unusual in its lines is the F.355, which is a low-wing cabin monoplane with "Renault" engine. The cabin top is swept up to form a sort of coupé top, the

effect being rather quaint. The passenger straddles the pilot's seat, the back rest of which is very narrow.

The larger machine, type F.390, is described as a *Grand Tourisme* type. It is actually the famous F.190 with a Farman 7-cylinder radial engine of 150-175 b.h.p. The machine has seating accommodation for 4.

*Hanriot*.—The three machines exhibited on the Hanriot (S.G.A.) stand are a type L.H.13 parasol monoplane designed for initial flying training, and the L.H.130 low-wing cantilever monoplane which won the Coupé Michelin. This has a 300 h.p. Lorraine "Algol" engine.

*Kellner-Bechereau*.—The complete machine on this stand is a low-wing cabin monoplane with smooth metal-covered wing, but the most interesting exhibit is the metal monocoque fuselage. M. Bechereau has evolved a form of



LIORE & OLIVIER : The upper photograph shows the large Leo 30 four-engined bomber. Note the 4-wheel undercarriage. Below, the C.L.10 Autogiro.



**TAILLESS :** The Nieuport-Delage 941 light plane has a 3-wheel undercarriage, the single front wheel being steerable.

construction which permits of obtaining a perfect streamline form without panel beating, the system, briefly explained, consisting in giving all the panels a trapezoidal shape. In this way the angles merely vary in accordance with the amount of taper, but all edges are straight, and no beating is required to make them follow the desired contour. The internal framework to which the panels are attached is in the form of extruded T-sections.

*Latécoère.*—The single machine exhibited is a type Lat.29, which is a strut-braced monoplane, and a twin-float seaplane. The machine obviously is a military version of the Lat.28 postal machines used by the Aeropostale company. A huge wing, said to be for a transatlantic seaplane, is also exhibited, standing on end, with its tip nearly reaching the roof of the Grand Palais.

*Levasseur.*—Pierre Levasseur shows a torpedoplane of somewhat unusual design. The arrangement of the wings may, perhaps, be described as an inverted sesquiplane, as the main wing is a wire-braced monoplane structure, and the small top plane and its associated struts mainly serve to give a good angle to the anti-lift wires. The machine is known as the type P.L.151, and has a 650 h.p. Hispano 12 Nbr. engine. It carries a crew of three. The wing surfaces have large holes cut in the fabric to show the internal structure, which consists of built-up Duralumin box spars and Duralumin ribs.

An interesting exhibit on this stand is a propeller carved out of "solid" steel. Further tests are being made, but M. Charles Frechet, the director of the firm, informs us that the preliminary tests have been very promising.

*Lioré & Olivier.*—Size is the keynote of this stand, both the machines exhibited being well described as a *Gros Porteur* and a *Tres Gros Porteur* respectively. The former is the type LeO H.25, and is a twin-float seaplane fitted with two Hispano engines. The wing area is 120 m.<sup>2</sup> (1,290 sq. ft.) and the gross weight 8 400 kg. (18,500 lb.).

The LeO 30 is a four-engined cantilever monoplane fitted with four Hispano engines, type 12 Nbr. At least these engines are to be fitted. At the show the

nacelles were empty. A four-wheeled undercarriage is used, each of the wheels being independently mounted on its own tripod. The machine is a bomber with a wing area of 2,000 sq. ft. and a gross weight of 33,000 lb.

The centre of attraction on the LeO stand is, however, the Pobjoy-engined Autogiro, a sketch of which was published in FLIGHT some weeks ago. The fuselage looks uncommonly short and "fat," but possibly is long enough. The directly-controlled rotor is of the three-bladed type, and is tilted laterally by a wheel, while a to and fro movement gives it its action as an elevator. The wheel arm runs on a curved rail, and a knurled knob locks it in any position. We gather that the machine has not yet been flown, not having been completed in time, but its future will be watched with interest.

*Morane-Saulnier.*—True to their tradition, the Morane-Saulnier firm are concentrating exclusively on parasol monoplanes at the show, of which they exhibit a considerable number.

The 332 is stated to be designed for aerobatics and "grand sport." The engine is enclosed in a N.A.C.A. cowl. The type 315 is a preliminary training machine, while the 230 is intended for intermediate training and aerobatics. The last machine is the type 225, and is a single-seater fighter fitted with Gnome-Rhone 9 Kbrs. engine, N.A.C.A. ring, and "spats" over the wheels. The machine will begin to be delivered to squadrons early next year, and is believed to have a very good performance.

*Nieuport-Astra (S.G.A.).*—Three Nieuport-Delage aircraft are exhibited this year. One is a long-distance reconnaissance parasol monoplane showing the usual Nieuport highly-finished metal skin application. The engine is a Hispano 12 Nb. unsupercharged and direct drive.

One of the most remarkable aircraft in the show is the Nieuport-Delage 590, which is of the class now described as "Colonial." It is a three-engined all-metal monoplane with 300 Lorraine engines. The fuselage "begins life" in front as an ordinary rectangular box, but a short



**AIR-COOLED PASSENGERS :** The Nieuport-Delags 590 "Colonial" monoplane has an open "balcony" which gives the machine gunners a free field and at the same time protects them from the slipstream.





THE POTEZ 49 : The lower wing is detachable, so that the machine can be turned into a monoplane.

distance behind the undercarriage the lower longerons are brought together fairly abruptly, while the upper longerons converge in the usual gradual manner. The result is that gradually a triangle is formed, and as the sides of the triangle (which is, of course, standing on its apex) are curved inwards, it will be seen that an exceptionally fine gun tunnel of large size is formed down each side towards the tail. For firing in that direction, or downwards, the open space which is left where the aft windows of a cabin would normally be gives the crew free movement and yet keeps them out of the slipstreams. We were assured that one can, in fact, lean out a considerable distance without losing the protection of the cabin part of the fuselage.

The third machine on the Nieuport-Astra stand is a tail-less light cantilever monoplane with 100 "Lorraine" engine. There is a three-wheeled undercarriage, the front wheel of which is steerable. Directional control is by rudders on the wing tips.

*Henry Potez.*—The reputation of the Potez firm is high both in France and abroad, and one therefore always watches the Potez exhibits with respect as well as interest. This year the famous French constructor (who, by the way, is chairman of the *Chambre Syndicale*) exhibits four aircraft, a light plane, a training machine, a ship's light flying boat, and a single-engined reconnaissance and bombing plane.

The light plane is the type 43, and is developed from the type 36, of which the firm has sold more than 300. The machine is a cabin monoplane fitted with "Potez" 100 h.p. engine, and the wings incorporate the permanently open slots which the 36 has made familiar.

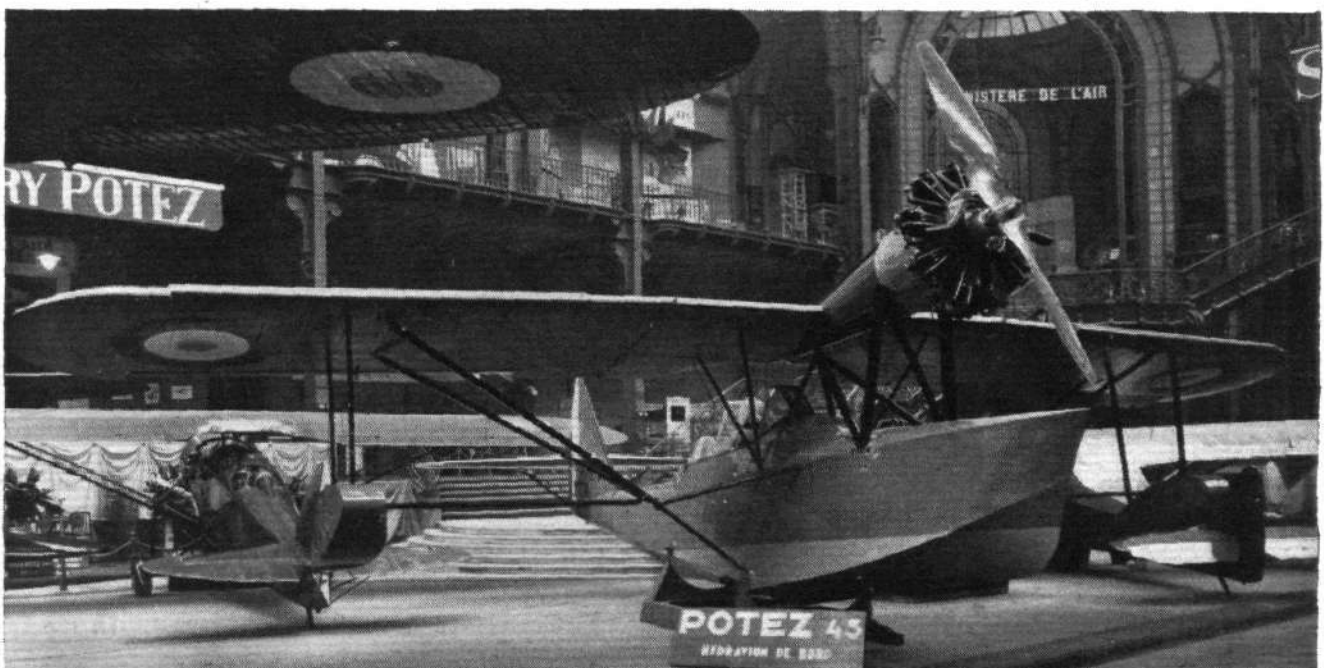
The Potez 51 is a parasol monoplane designed for inter-

mediate training, and is fitted with 160 h.p. "Potez" engine.

Designed for catapulting from surface vessels, the Potez 45 is a small tractor two-seater flying boat intended for coastal reconnaissance and patrol. It is mainly of wood construction, and is chiefly interesting because of its unusual engine arrangement. The engine is placed far ahead of the wing, the tail fairing being cone shaped and coming almost to a point where it merges into the leading edge of the wing. The pilot and observer are placed far aft, and the monoplane arrangement gives a good downward view for the observer.

The Potez 49 is developed from the 39, or more correctly speaking is the 39 but with a removable lower wing added. This wing is merely secured to the fuselage and strutted to the top wing, and can be removed and replaced quickly, according to the duties for which the machine is required. These are reconnaissance, bombing and relief. The last expression needs a little explanation. For work in the Sahara regions it is sometimes necessary to send relief, food, equipment, etc., to outposts, and the Potez 49 has been designed to fulfil these duties. The engine is a Hispano 12 Hb. The wing area is 33 m.<sup>2</sup> (355 sq. ft.) as a monoplane and 44 m.<sup>2</sup> (473 sq. ft.) as a biplane. As a monoplane the gross weight is 2 493 kg. (5,480 lb.) and as a biplane 2 841 kg. (6,250 lb.). The maximum speed of the monoplane is 237 km./h. (147 m.p.h.) and of the biplane 210 km./h. (130 m.p.h.).

S.A.F.A.—Société Anonyme Française Aeronautique exhibit a S.A.F.A. F.K.43, which is a Koolhoven design, the S.A.F.A. holding the French licence. The machine is a four-seater cabin high-wing monoplane, and is fitted with



THE POTEZ 45 : This is a "catapultable" flying boat for coastal patrol. Note the unusual placing of the engine.

a "Hermes" engine, examples of which are also exhibited on the stand.

**S.E.C.M.**—A large cantilever monoplane flying boat is the only exhibit of this member of the S.G.A. group. This is a Latham type 110 reconnaissance and bombing aircraft, and is of all-metal construction, Duralumin being used for covering both wing and hull. The engine is a Hispano 12 Nbr. of 650 b.h.p. It is mounted on a very narrow framework and steadied laterally by struts on the starboard side only.

**S.P.C.A.**—The two S.P.C.A. machines are very similar in general lines to those previously exhibited by this firm. One is a three-engined high-wing monoplane of metal construction (3 "Salmson" 9 NC of 135 h.p. each), and the other a single-engined machine of similar design and construction, fitted with Gnome-Rhone "Titan Major" engine of 300 h.p.

**Wibault-Penhoet.**—The 282 T 12 exhibited on this stand has been in service on the C.I.D.N.A. lines with considerable success, and the Wibault type of construction, with flat plate skin covering, appears to have proved itself. The machine is one of those which "look right." The three engines are Gnome-Rhone 7Kd. of 350 h.p. each.

The Wibault-Penhoet 365 T 7 is a single-engined low-wing cantilever monoplane, also of all-metal construction, and carries 7 passengers over a range of 600 miles at a cruising speed of 265 km./h. (165 m.p.h.). The engine is a Gnome-Rhone 9 Kbrs. of 500 h.p. A drag-reducing cowling ring is fitted.

**Zodiac.**—Société Zodiac exhibit a tiny low-wing monoplane, type Mauboussin M.121, fitted with the new geared Salmson 9 AD-R engine, which is rated at 60 h.p.; a somewhat peculiar cowling ring is fitted.

#### The Italian Exhibits

Italy is represented at the Salon de l'Aeronautique by two Breda machines, one Caproni, one Fiat, and one Savoia.

Both the Bredas are school machines, and both are biplanes. One is the type 19 and is a single-seater used for training in aerobatics, etc., while the other is a two-seater, type 25. Both are fitted with "Walter" engines.

The Caproni 97 is a single-engined strut-braced cabin monoplane with Alfa Romeo "Jupiter" engine, and is intended for light transport.

A military touch is lent to the Italian exhibit by the Fiat C.R.30, which is a single-seater fighter with Fiat A.30 R engine. A maximum speed of 360 km./h. (223 m.p.h.) is claimed for it.

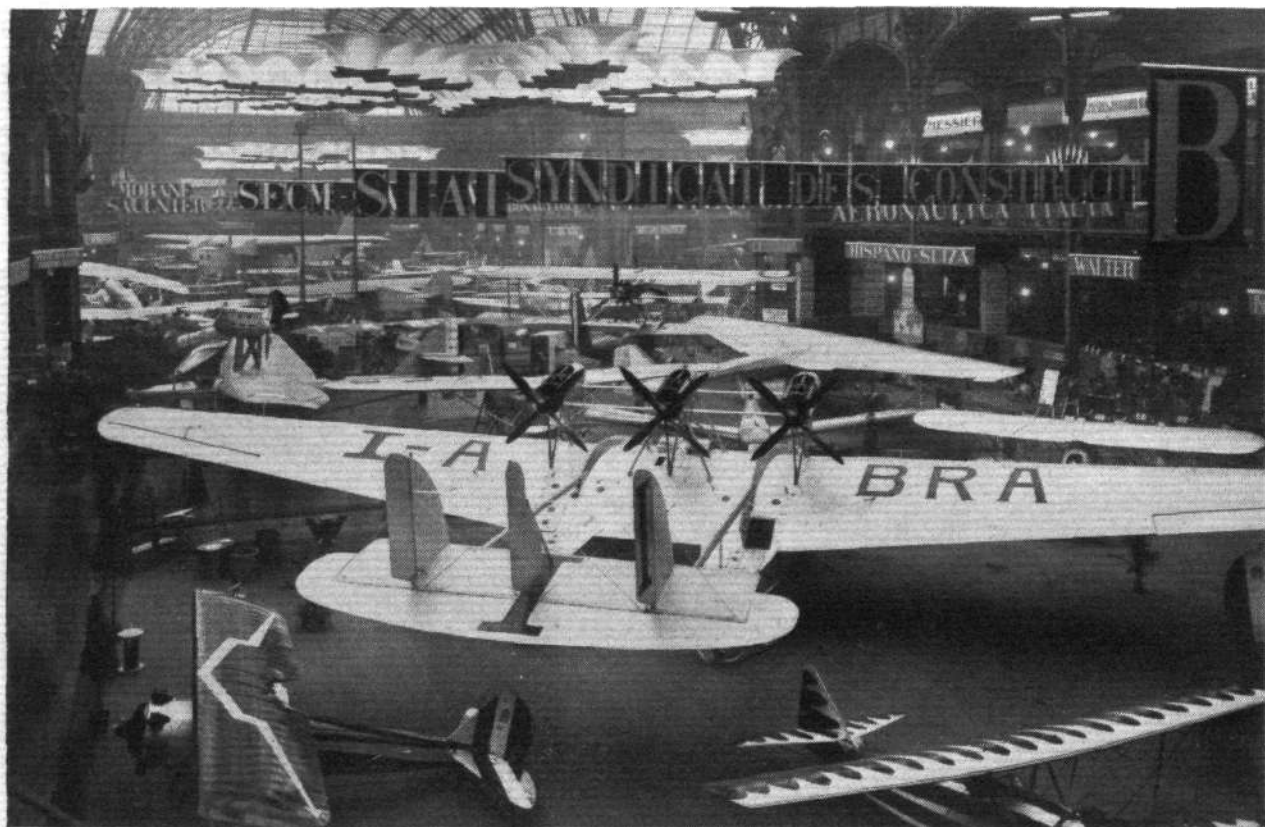
The Savoia-Marchetti S.66 is similar in general design to the S.55, i.e., is a cantilever twin-hull seaplane. It is, however, fitted with three instead of two engines (Fiat A-24 R of 700 h.p. each), driving pusher airscrews. With a disposable load of 3 040 kg. (6,680 lb.) the cruising speed is claimed to be 133½ m.p.h. The machine is said to be capable not only of level flight but of climbing with any one of the engines stopped.

#### Poland's Contribution

Three machines are exhibited by Poland, one being the R.W.D.6 on which Zwirko won the International Touring Competition this year. The machine, it will be remembered is fitted with Armstrong-Siddeley 7-cyl. "Genet Major" engine. We are informed that it has now been established that Zwirko lost his life through one of his wings striking the sides of a steep mountain wall while he was flying through a pass into Czechoslovakia during exceptionally bad weather. At first it was rumoured that the wing broke in the air, but it is now thought that the wing struck the mountainside first.

On another stand are exhibited two single-seater fighters of the P.Z.L. type. The P.VIII was exhibited at the last Paris show, and the type has, we understand, done good work in the Polish Air Force. The P.XI is the latest development of the P.VIII, and differs from it mainly in having a more rounded and therefore presumably better streamline fuselage. It will be recollected that unusual features are the "gull's wing" shape of the main planes, which have a pronounced bend in them, and the undercarriage, which has the springing arranged inside the fuselage.

When fitted with the "Gnome-Rhone" K9 or "Mercury" engines the P.XI has a speed, it is claimed, of 350 km./h. (217 m.p.h.) at 4 000 m. (13,000 ft.). The engine is fitted with Townend ring cowling.



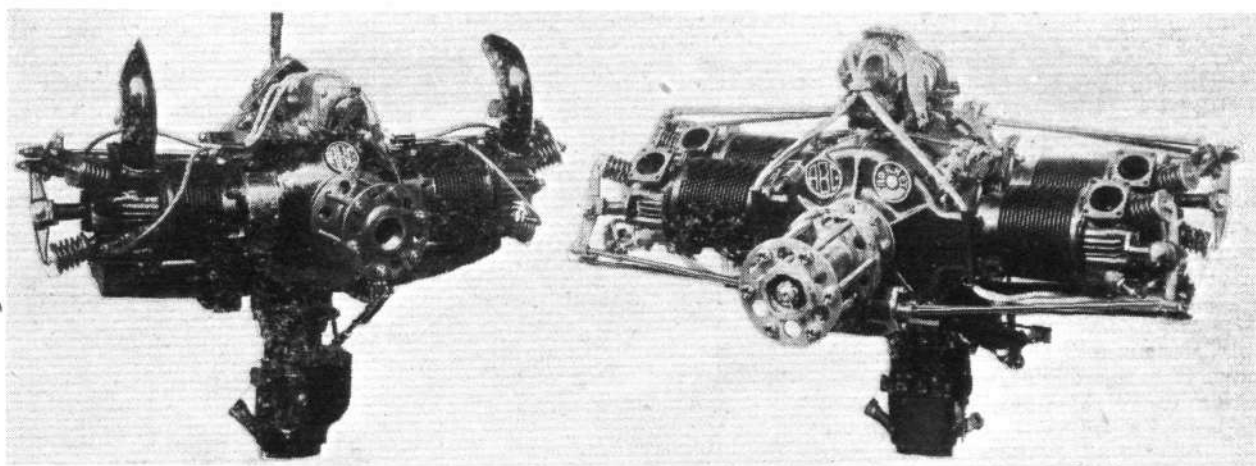
FROM THE GALLERY : The Grand Palais as it appears when viewed from the Northern end. In the foreground the Italian stand.





# British Aero Engines

**W**E published, last week, in a special supplement, a survey of all the more important types of aircraft which the British aircraft industry has to offer, and this week we are following up that supplement with another one containing a representative selection of British aero engines of the types which are responsible for the excellent performance and reliability of British aircraft. In the space at our disposal it is obviously quite impossible to give more than a very cursory description of just a few of the most important engines produced by each firm, and the omission of any engine from our list must not be taken in a derogatory sense. Those listed here are not necessarily being exhibited at the Paris Aero Show, which is reported in another part of the paper.



The A.B.C. "Scorpion" (34 h.p.)—left, and the A.B.C. "Hornet" (75 h.p.)—right.

## A.B.C. MOTORS, LTD. Walton-on-Thames

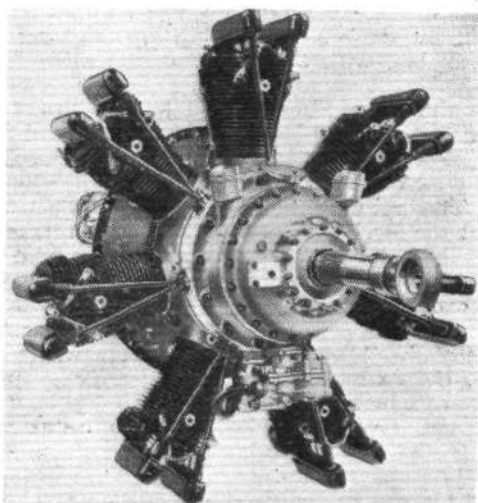
**A.** B.C. MOTORS, LTD., are manufacturers of two types of horizontally opposed cylinder, air-cooled engines. The first of these, the "Scorpion," is a two-cylinder model giving 34 h.p. and the second a four-cylinder of 75 h.p., which is in effect a tandem version of the smaller engine. The cylinders of the two types are interchangeable, with a bore and stroke of 102 mm. and 122 mm. The cylinder heads are of cast iron and are bolted direct to the steel cylinder barrels. Two valves are fitted to each cylinder head operated by push rods. The induction manifold is particularly neat and is cast integrally with the lower

half of the crankcase, thus utilising the heat of the oil to warm the mixture, while at the same time cooling the oil. The crankshaft, of one piece, has a roller bearing at each end with a central plain bearing between the throws in the case of the four-cylinder engine. Single or dual ignition can be fitted as desired and a Zenith carburetter supplies the mixture. The auxiliary drives are taken by gearing through the rear end of the crankshaft and on its front end the airscrew boss is fitted. Mounting in the aircraft is effected through the medium of four steel tubes fitted horizontally to the crankcase, forming engine bearings.

## ARMSTRONG SIDDELEY MOTORS, LTD. Coventry

**E**NGINES which emanate from the Armstrong-Siddeley works at Coventry may well be classed as a family, inasmuch as these engines all have the same general characteristics and in many cases are built up from identical parts, the difference lying often only in the number of cylinders. At the Paris Show a geared model of the 800-h.p. "Leopard," a geared and moderately supercharged 545-h.p. "Panther," a "Double Mongoose" of 340 h.p., a "Lynx" of 215 h.p., and the seven-cylinder "Genet Major" of 140 h.p. are shown.

The complete series produced by this factory covers the power range of from 80 to 800 h.p., and most of the engines can be obtained in geared and supercharged models. Common to each of these engines, in so far as the main characteristic features are concerned, is the general design of



The Armstrong-Siddeley geared "Lynx" (215 h.p.).

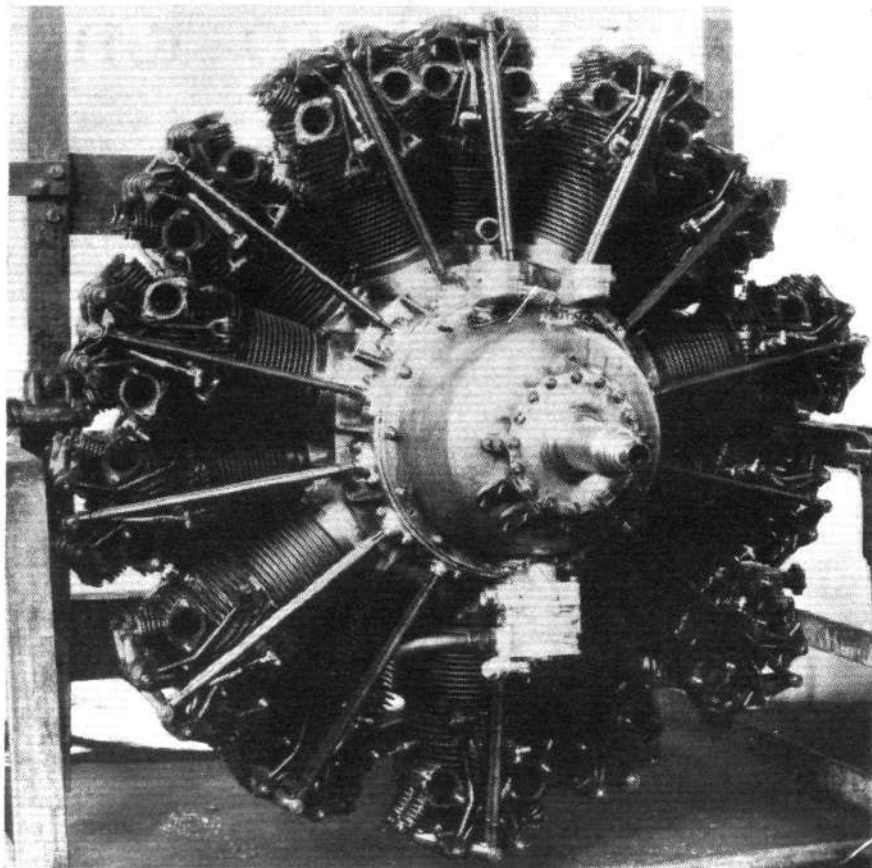
the crankcase, which is a single casting closed by front and rear covers, a one-piece crankshaft, a connecting rod assembly of the master-rod type, and cylinders of composite construction having aluminium alloy heads screwed and shrunk on to steel barrels.

The five-cylinder engines are the "Genet" (80 h.p.), "Genet Major" (100 h.p.), and "Mongoose" (150 h.p.). Seven-cylinder engines include the seven-cylinder "Genet Major" (140 h.p.), the "Lynx" (215 h.p.), and the "Cheetah" (260 h.p.); the last-named being previously known as the "Lynx Major." The ten-cylinder engine is the "Double Mongoose" (340 h.p.). The fourteen-cylinder range includes the "Jaguar" (400 and 460 h.p.), the "Panther" (535 h.p.), the "Tiger" (600 h.p.), and the "Leopard" (800 h.p.). The "Tiger" is a new engine and

the "Panther" used to be called the "Jaguar Major." The "Leopard" engine has particularly been designed for use in torpedo planes, heavy bombing and load-carrying aircraft, and is believed to be the most powerful radial air-cooled engine in the world. The 14 cylinders are arranged radially (as in others of the Armstrong-Siddeley family) in two staggered banks of seven cylinders, each cylinder being fitted with two inclined valves worked by push rods enclosed in tubes. The induction system incorporates a fan, geared to run at a higher speed than that of the crankshaft, in order to maintain power at high altitudes.

The "Genet Major," "Cheetah" and "Panther" are in reality larger versions of the "Genet," "Lynx" and "Jaguar" respectively, the difference being that the bore and stroke or the bore alone is increased in each case. The geared versions use the spur wheel epicyclic type of reduction gear. The "Panther" is fitted with reduction gearing as standard and the engine can be obtained either in the supercharged form or with a geared fan. Its construction closely follows that of the "Leopard."

One of the newest of the range is the "Double Mongoose," and, as our readers will know, it is this engine which has been chosen for the "Atalanta" monoplanes recently built for Imperial Airways by Sir W. G. Armstrong-Whitworth Aircraft, Ltd., for use on the new African air route. "Lynx" and "Jaguar" engines have been standardised in the Royal Air Force for many years, the former in training aircraft of the Avro 504 type, the latter in single-seater fighters like the "Siskin" and Army Co-operation aircraft like the "Atlas." The 14-cylinder arrangement of the "Jaguar" definitely provides a very smooth running engine, and moreover one which starts very easily. In commercial work it has been used extensively by Imperial Airways in its Avro 10 aircraft and also by the K.L.M. airline in its Fokkers. The seven-cylinder "Genet Major" of 140 h.p. is one of the smoothest running engines of this horse-power, and is particularly suitable for privately-owned aircraft or for training aircraft



The Armstrong-Siddeley "Leopard" (800 h.p.).

where the cost of training is of great importance. It is used in aeroplanes like the Avro "Cadet," which the Irish Free State Government have ordered for training in their Air Force, and in Avro "Avians" by Air Service Training Ltd., at their Hamble school. During last summer this engine was used by the Polish "R.W.D." machine which won the International Touring Competition, and it is now fitted in many small civil aeroplanes, as well as flying boats like the "Cutty Sark."

## THE BRISTOL AEROPLANE CO., LTD. Filton, Bristol

THE Bristol Aeroplane Co. have established a world-wide name for their radial engine, the "Jupiter." During this year the "Jupiter" has, however, been replaced by the "Pegasus" and "Mercury," and both these types are being shown at the Paris Show. In general design these follow the "Jupiter" in being nine-cylinder, radial, air-cooled engines. There are several types of these engines, all of which have a 5.75-in. bore and 7.5-in. stroke. Two ratios of airscrew reduction gear are available, with 3 degrees of supercharge.

The "Pegasus" range is intended for the use in aircraft of all types, requiring engines of between 500 and 600 h.p., excepting the high-speed single-seater. For this type of aircraft the "Mercury" IV S.2 engine, which is of smaller overall diameter, has been designed. The cylinder bore remains the same as the "Pegasus," but the stroke is only 6.5 in., while the speed of rotation is higher. Further, the supercharger is designed to deliver a higher degree of supercharge, so that this engine gives excellent power at high altitudes.

The range at present available consists of the "Pegasus" S.2 and S.3, M.2 and M.3, L.2 and L.3, U.2 and U.3, F.2 and F.3. The S.2 and S.3 have airscrew reduction gearing of 0.655-1 and 0.5-1 respectively, and give a rated horse-power of 525 b.h.p. at 11,000 ft. at the normal r.p.m. of 2,000 or 570 b.h.p. at a maximum r.p.m. of 2,300. These two engines are intended for use in lightly loaded, general-purpose Service aircraft for high altitude work or for fast mail or passenger carrying civil aircraft operating at high altitudes. They are not intended for heavier flying boats or commercial aircraft whose normal

work is carried out at moderate altitudes.

The M.2 and M.3 have the same reduction gearing respectively as the previous engines, but their superchargers have a lower output, so that their rated altitude is only 4,500 ft. At this height the power at normal r.p.m. is 555 b.h.p. and 615 b.h.p. at maximum r.p.m. These engines are suitable for the lighter types of flying boats, seaplanes and commercial aircraft operating at moderate altitudes and for certain classes of military aircraft such as general-purpose machines and bombers having similar requirements.

The L.2 and L.3 series are similar to the previous engines in general respects, and particularly as regards the reduction gearing. They have a low-duty blower giving a power of 590 b.h.p. at a rated altitude of 1,500 ft., with a high take-off power of 620 b.h.p. The power at maximum r.p.m. is 635 b.h.p. An automatic boost control is desirable with these engines and is fitted as standard. They are particularly recommended for use in commercial aircraft and in general service military machines, where high performance at great altitudes is not usually required. The L.3 is the ideal engine for large flying boats which require considerable power for taking off, but which do not usually fly at very great altitudes.

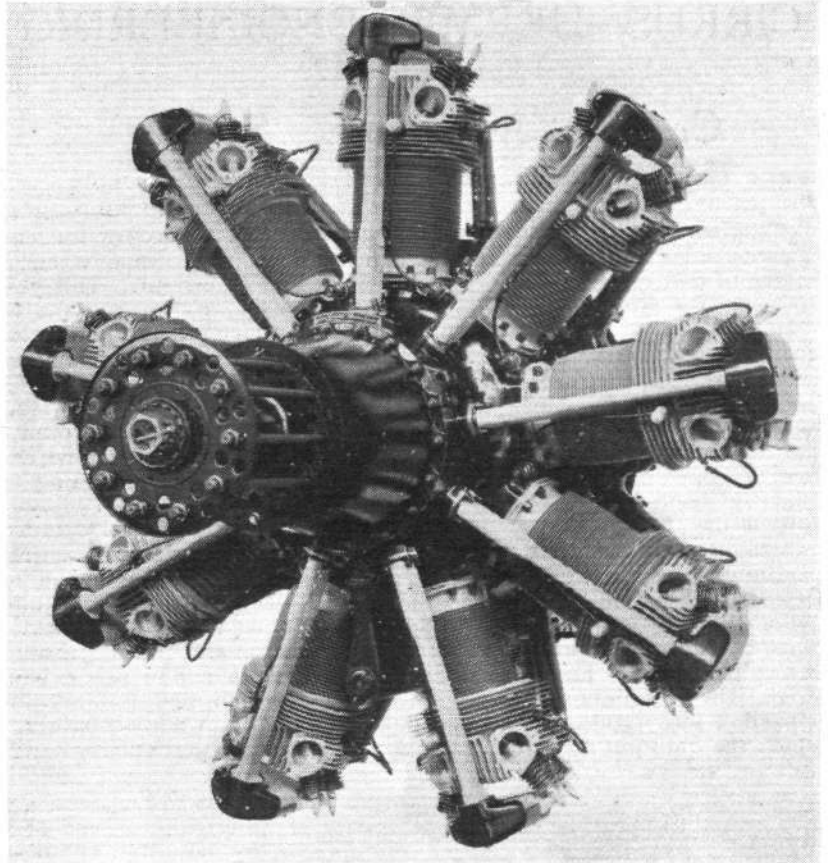
The U. series are intended particularly for commercial aircraft. At a rated speed of 1,900 r.p.m. their power is 550 b.h.p., while at a maximum r.p.m. of 2,185 the power is 630 b.h.p. The full 550 b.h.p. is available for take-off at normal speed. These engines can be cruised indefinitely at their rated speed.



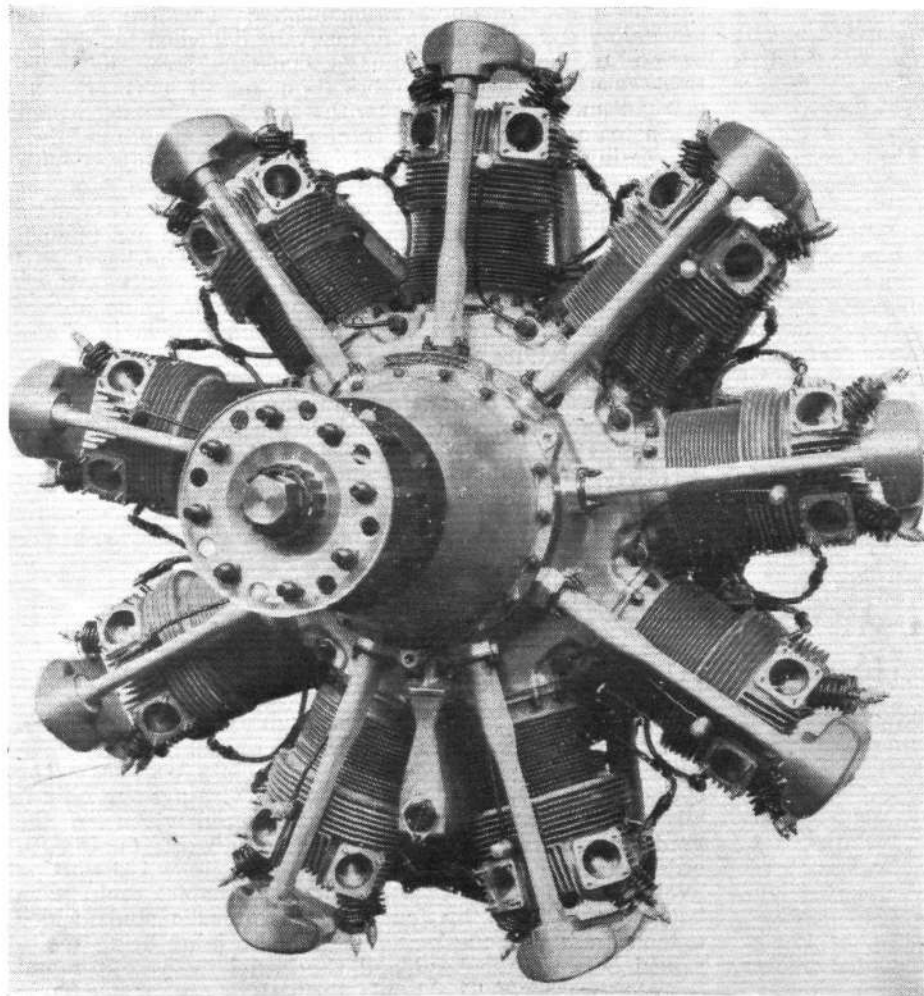
The F.2 and F.3 "Pegasus" differ from the other engines in that no true supercharger or blower is fitted. Instead they have a fan mounted directly on the crankshaft which serves not only to give better distribution, but also slightly more power than is obtained from a naturally aspirated engine, having no fan. They are suitable for commercial aircraft where moderate performance at altitude will suffice and have the merit of extreme simplicity of the induction system. The normal and maximum speeds are 2,000 and 2,300 r.p.m. respectively, giving at sea level 535 and 590 b.h.p.

For the convenience of readers we give the following table, which explains clearly the symbols used in connection with both the "Pegasus" and "Mercury" engines:—S.—fully supercharged; M.—moderately supercharged; L.—low-duty supercharger; U.—geared induction fan; F.—engine speed induction fan; 2—airscrew reduction gear 0.655:1 ratio; 3—airscrew reduction gear of 0.5:1 ratio.

The "Mercury" IV S.2 is a very compact engine having a small overall diameter, and therefore particularly suitable for high performance fighters or similar aircraft having a speed at high altitudes of 200 m.p.h. or more. As the symbols denote, the airscrew reduction gear ratio is 0.655 to 1, thus allowing a higher airscrew efficiency to be obtained than is otherwise possible with the high r.p.m. of which this engine is capable. The supercharger having a high gear ratio maintains the normal pressure in the induction system up to an altitude of 13,000 ft., at which the power is 505 b.h.p. At a speed of 2,250 r.p.m. the maximum power obtainable is 560 b.h.p. at 2,600 r.p.m. at an altitude of 16,000 ft.; take-off power is 530 b.h.p. at 2,250 r.p.m. One of the chief points of the new engines as compared to their prototypes is the new design of overhead valve rocker gear, which is completely enclosed and lubricated, the push rods



The Bristol "Pegasus" (500/600 h.p.).



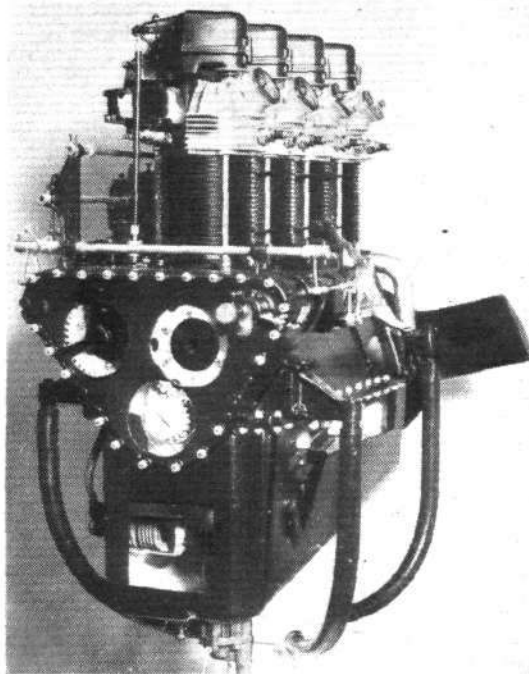
The Bristol "Mercury" (505 h.p.).

also being enclosed in oval tubes. The supercharger unit has been arranged so that any required degree of supercharge can be provided without the necessity for changing any parts, but those actually involved. The rear cover, which carries the magnetos, pumps and auxiliary drive, has also been re-designed and the general accessibility greatly improved. A new method of mounting has been incorporated whereby the front nickel-steel plate is sandwiched between the crankcase and the supercharger unit, thus affording a mounting bolt circle of large diameter. Hubs suitable for either metal or wooden airscrews can be supplied, and it should be noted that the Bristol Co. themselves are now producing two-, three- and four-bladed types of airscrews having blades of light alloy for use with their engines. Of particular interest to users in cold climates is the new oil pump system which enables the engine to be started safely and run up on cold oil. Any of the usual forms of starter can be fitted. Both the "Pegasus" and the "Mercury" may be used in pusher installations, while new types of exhaust collector rings, greatly reducing back pressure, have been standardised. The master connecting rod, the articulated rod and the crankshaft in the "Pegasus" have all been stiffened very considerably when compared with the "Jupiter," while the bearing areas of the crank pins and gudgeon pins have all been increased. The new reduction gears are more compact and consequently lighter than the former design, though no sacrifice has been made in strength and reliability. The closer pitched fins on the cylinder head and barrel and the enclosed valve rocker gear are also much neater than those on the older engines.

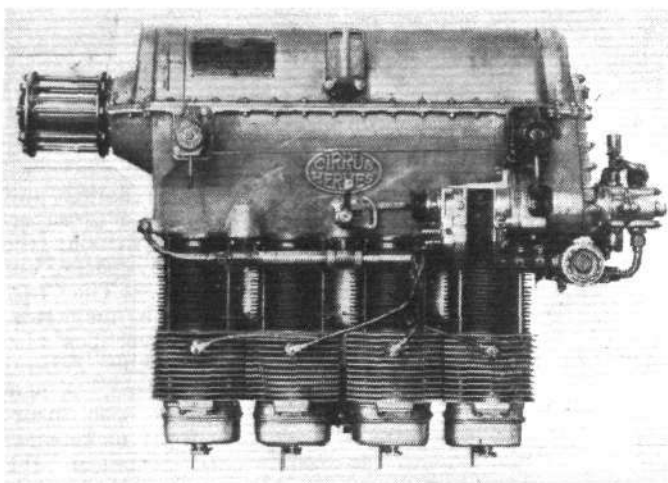
## CIRRUS—HERMES ENGINEERING CO., LTD.

Croydon Aerodrome, Surrey

**W**ELL known, the "Hermes II" (110/118 h.p.) is the successor to the "Cirrus," of which it is truthfully said that "it was the engine which made light aircraft possible." The modern tendency towards inverted engines naturally determined the company on an engine of this type and the "Hermes II.B" was the result. This year, however, the King's Cup Race saw the advent of its latest type, the "Hermes IV" (130 h.p.), and not only in this race but in many subsequent ones this engine has conducted itself in an exemplary manner. In general design it follows the "II.B" in that it is a 4-cylinder-in-line inverted air-cooled engine. It is necessary for engine makers to study means whereby they can assist the aircraft designer to give the pilot of the machine a reasonable forward outlook. The inverted engine does this, as the thrust line may still be kept high without impeding the view by having a block of cylinders in front of the pilot. The cylinders of the "Hermes IV" are made from special centrifugal cast iron and the fins are machined from the solid, thus ensuring sound castings, maximum rigidity, and efficient heat radiation. The cylinders are locked in the crankcase by deep spigots. Detachable aluminium alloy cylinder heads, with particularly adequate cooling fin area, are held in place by long studs projecting from the crankcase and passing through the cylinder fins. Each head carries one large inlet and one exhaust valve, the aluminium bronze seatings for which are screwed and expanded into position. The pistons are aluminium alloy castings in which the question of heat distribution has received particularly careful



The Cirrus-"Hermes IV" (120/130 h.p.).  
Sectioned for exhibition.



The Cirrus-"Hermes II" (110/118 h.p.).

with a substantial journal ball bearing fitted on the front end to absorb the propeller thrust. The camshaft is of the one-piece type, driven by a train of spur gears and is carried on five bronze bearings fitted in the lower half of the crankcase. The explosive mixture is supplied through a Claudel Hobson A.V. 48.D carburettor which has an altitude control to enable the correct mixture to be used at high altitudes. The valves, machined from K.E.965 steel, are interchangeable and are operated by the camshaft through tappets, tubular push rods and rocker levers. A particular point about the operation of the valve gear is that the whole mechanism is enclosed in cast light alloy covers which may easily be detached for examination and which maintains a constant level oil bath, thus ensuring adequate lubrication to all parts of the mechanism. In keeping with standard practice, two magnetos are fitted, driven through vernier couplings, thus facilitating accurate timing; one magneto is fitted with an impulse starter. Should it be required to use hand, or compressed-air, starter gear on "Hermes" engines, these may easily be fitted, as also may engine-driven fuel pumps, gun gear mechanism or other auxiliaries. The lower half of the crankcase is an aluminium alloy casting which houses the main bearings and the upper half, being merely a cover, is of elektron. The lubrication system is of the pressure-feed type and a scavenger pump returns the oil from the crankcase, after use, to an oil tank in the aircraft. Resilient bearer feet are supplied as part of the engine equipment. The special design of the head has to a large extent solved all cooling problems, and it is only necessary to provide a side chute which will in future be supplied as an integral part of the engine.

consideration. The gudgeon pin is of the full floating type located at each end by circlips. The connecting rods are made from high quality steel stampings very carefully machined all over. This form of construction ensures adequate strength with minimum weight and a high degree of balance. White metal alloy bearings are provided in the big ends and a phosphor-bronze bush is tightly pressed into the small end of the rod. The crankshaft is a special, high quality, alloy steel forging, carried in five diecast bearings,

## THE DE HAVILLAND AIRCRAFT CO., LTD.

Edgware, Middlesex

**L**ATEST of the de Havilland "Gipsy" engine series is the "Gipsy Major," and this, together with the "Gipsy III" engine, is being exhibited at the Paris Salon by the French licensees; Société Anonyme des Etablissements, Emile Regnier, 27, Rue du Refuge, Versailles, France.

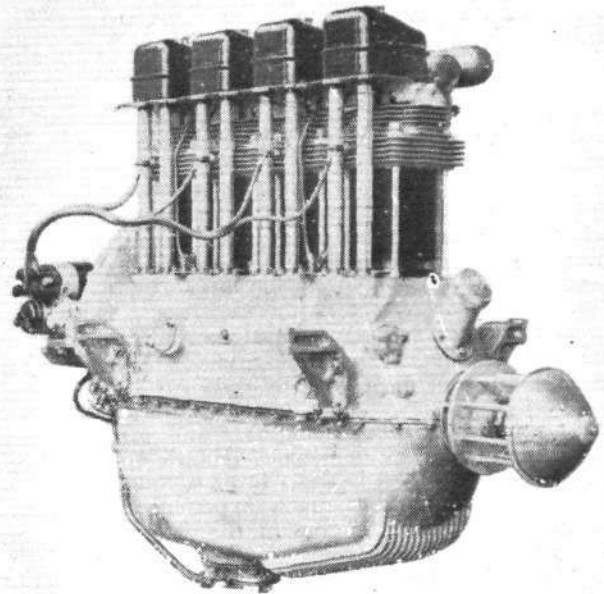
In its general characteristics the "Gipsy Major" resembles the "Gipsy III," being a 4-cylinder, inverted, air-cooled, direct drive engine, but the power has been increased to 120 at 2,100 r.p.m. with a maximum b.h.p. of 130 at 2,350 r.p.m. The "Gipsy Major" is a left-handed tractor with a bore and stroke of 118 mm. and 140 mm. respectively, giving a capacity of 6,124 c.c. The compression ratio is 5.25:1, while the engine, complete with airscrew

boss; weighs 305 lb. The fuel consumption at full throttle, i.e., 2,350 r.p.m., is 9.75 gall. per hr. and the oil consumption at normal power is 1.25 pints per hr. The cylinder barrels are carbon steel forgings machined all over and special attention has been given to the gradation of wall thickness and depth of finning in order that the cooling effect may be even and distortion avoided. The cylinder heads are detachable, each being held to the barrel by four long high-tensile studs which extend from the crankcase, a gastight joint being maintained between the head and the barrel by a copper and asbestos washer. The heads themselves are now cast in aluminium bronze with the valves seating directly on to a seating cut in the head. One inlet and one exhaust



valve is provided for each cylinder and the sparking plugs are screwed, one on either side, directly into the head, no adaptors being necessary. The valve ports and manifolds are arranged on the right-hand side, so that the slipstream from the airscrew, which is a left-handed tractor, carries any fumes away from the cockpits, and also reduces the noise. The pistons are of the slipper type, cast from D.T.D. specification 131 aluminium alloy; so designed that the thrust from the crown is taken direct to the gudgeon pin bosses and is not transmitted via the skirt. Three rings are fitted below the gudgeon pin on each piston, that nearest the pin being of the scraper type. Fully floating gudgeon pins, locked at each end by external circlips, have been adopted. The connecting rods are machined from forgings of D.T.D. 130 alloy, a bronze shell, lined with white metal, forms the big end bearing and the big end itself is exceptionally rigid. The crankshaft is made from a nickel-chrome alloy steel forging, machined all over and carried in five plain bearings. A ball journal bearing is provided near the front end to locate the shaft and to take the thrust in either direction from the airscrew. All main bearings are fed continuously with oil under pressure. The airscrew hub is fitted on a carefully designed tapered extension of the crankshaft, provided with eight bolts and a quickly detachable spinner. The main boss need not be disturbed on its taper when changing the airscrew. This operation can be performed very easily and quickly by withdrawing the airscrew together with the flanged sleeve which is specially made so as to be an easy fit over the boss proper. The crankcase and top cover are light alloy castings, bolted together in the horizontal plane of the crankshaft centre line. The crankcase is very deep and well webbed internally; each intermediate bearing being supported by a stiff cross member extending right across the crankcase. The main bearing shells are retained by separate caps, which, being readily accessible by removal of the top cover, facilitate assembly, inspection and overhaul. Appropriate facings are provided on the crankcase for bearer feet, breather, fuel pumps, oil drain pipe and lifting attachments.

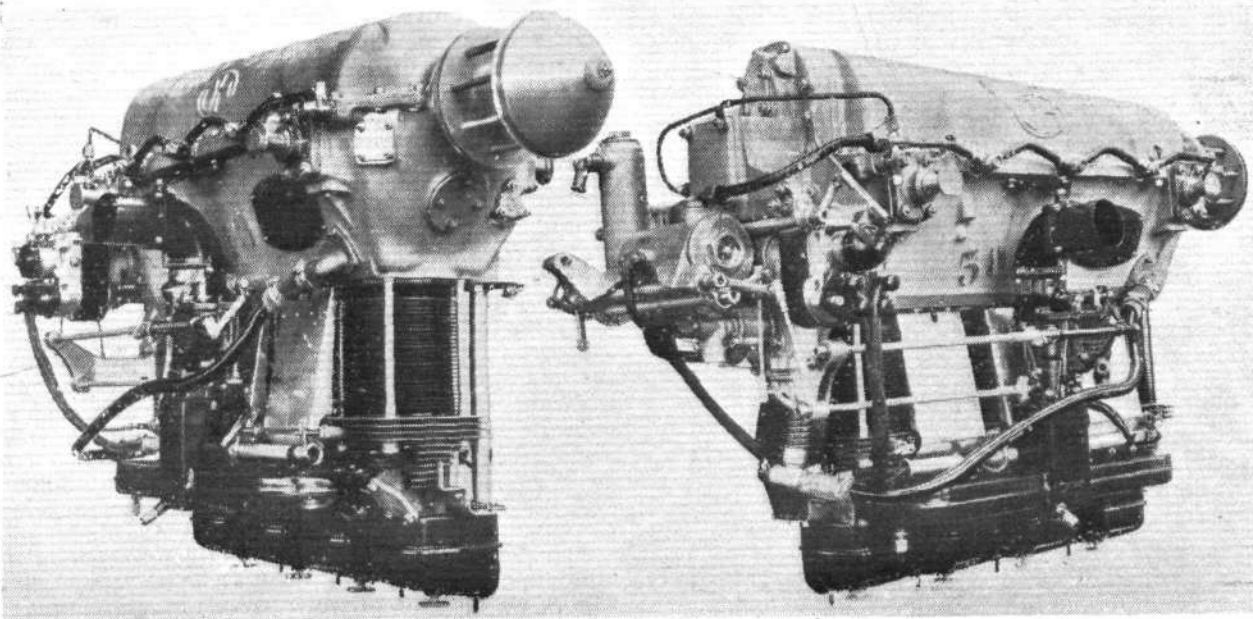
The camshaft is very rigidly supported by five plain bearings on the left-hand side of the crankcase and operates directly on to hardened steel tappets. Tubular duralumin push rods and steel rockers oscillating on hardened spindles attached to the cylinder head by stout steel brackets serve to actuate the valves. The whole of the valve gear is totally enclosed and is lubricated by splash from the rockers dipping in an oil bath provided in the valve casing covers. Timing gears are housed in a separate cover built on to the rear end of the crankcase, and the camshaft is driven by spur gears from the crankshaft. The explosive mixture is provided by a Claudel Hobson A.1 48a Down Hyphenate draught carburetter fitted on the right-hand side of the engine, the vertical lead of which, to the induction manifold, is jacketed by the exhaust gases. Efficient carburation is thus ensured even in the coldest weather. Bosses can be provided on the induction manifold for connection to a doper system



The de Havilland "Gipsy II" (108/110 h.p.).

which, though normally unnecessary, may be used if desired. Mixture control is provided on the carburetter by an "air-bleed" valve, hand operated from the cockpit.

Lubricating oil is carried in the fuselage in a separate tank and drawn therefrom through a gear type pump situated on the timing cover. From the pump the oil flows through a Tecalemit felt filter which ensures the removal of even the finest particles of foreign matter before the oil passes into the engine. This filter is so positioned that it can easily be removed for cleaning. The main supply from the filter is taken by an external gallery along the side of the crankcase, where it is connected by drillings to the five main bearings, thence it passes into the crankshaft through the hollow journals, and so to the crank pins and big ends. Holes are drilled in the big end bearings and connecting rod caps from which oil is thrown on to the cylinder walls and pistons. The lubrication of the cylinders is thus maintained irrespective of wear and clearance in the main bearing; the spray created in the crankcase also serves to lubricate the camshaft bearings, cams and tappets. The oil ultimately collects in the space formed by the extension of the cylinders into the crankcase whence it is returned by external pipes to the tank. An important point about these engines is the fact that the whole range is designed to run on any good grade of automobile fuel while the lubricating oils recommended are obtainable without trouble at all aerodromes where supplies of the better known brands are held.



The de Havilland "Gipsy Major" (120/130 h.p.).

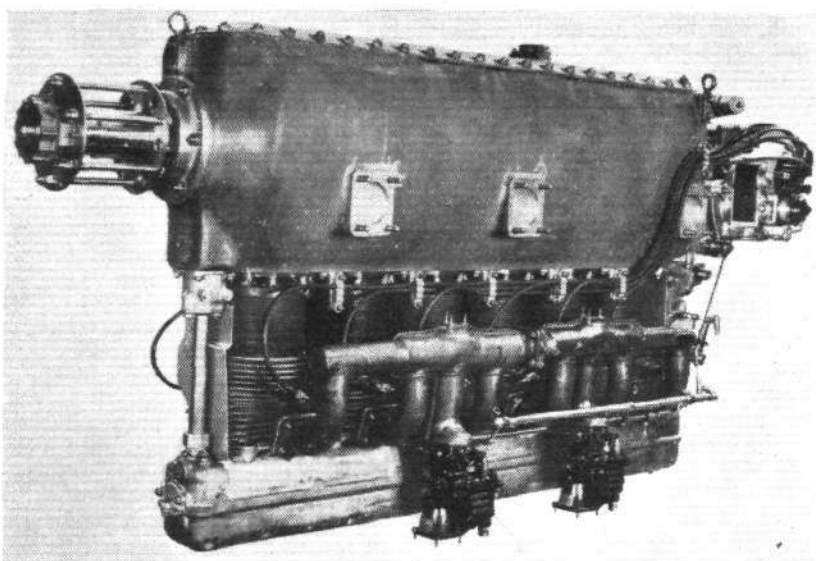
## D. NAPIER & SON, LTD.

Acton, London, W.3

**I**N its general arrangement, the Napier "Lion" engine, with its broad arrow shape allowing of its 12 cylinders being arranged in three banks of four each, is very well known to our readers. Developing 600 h.p. at 2,600 r.p.m. it only weighs 1.67 lb. per h.p. The bore is  $5\frac{1}{2}$  in. and the stroke  $5\frac{1}{8}$  in., and the usual compression ratio 6:1. Napier "Lion" engines have been used in the Royal Air Force for a very long time and have participated in a great number of notable flights.

Another Napier engine which bids to create a great deal of interest is the "Rapier." During the past twelve months much experience has been gained with this engine in the air, fitted in the de Havilland "Interceptor Fighter." Its design is unique, being of "H" section having four banks of four cylinders each, all placed vertically. It will thus be seen that this unusual design enables the head resistance to be cut down to a minimum and, while eliminating the disadvantages of the radial arrangement, retains the advantages of being air-cooled. The cylinders are formed of steel barrels with integral fins and have aluminium heads screwed into them. There are two crankshafts each of the four-throw type placed one either side of the crankcase and geared to a central airscrew shaft. The valves are overhead and operated by tappet rods and rockers, from two camshafts in the crankcase. The carburetter delivers the mixture through a centrifugal supercharger driven by an extension of the airscrew shaft. The weight is 720 lb. and output is 305 h.p., at an altitude of 10,000 ft., at 3,500 r.p.m.

Another interesting engine which the firm have produced recently is a six-cylinder air-cooled inverted engine designed chiefly for civil purposes. Flying tests have been made extensively in a Spartan "Arrow" with this engine, and it has now been granted the Air Ministry Airworthiness Certificate. This is a direct drive engine, giving 150 b.h.p. at 2,000 r.p.m. and 170 b.h.p. at 2,300 r.p.m. The bore and stroke are 4.5 in. and



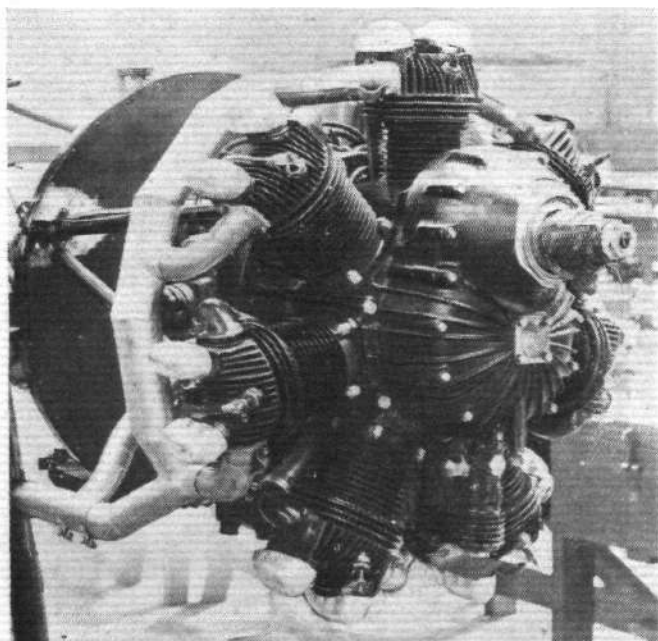
The latest Napier, a 150/170-h.p. air-cooled engine.

5.25 in. respectively, and the compression ratio is 5.1:1. The cylinders have steel barrels with cast aluminium heads screwed into them. The pistons are of aluminium alloy and have two compression rings and two scraper rings.

The six connecting rods are machined from special high-grade steel. The crankshaft is machined from a solid steel forging and is of the more or less standard six-throw type. It is carried in eight white-metal lined bearings, with a deep groove ball bearing to take the airscrew thrust. The crankcase is a very interesting casting of such a shape that perfectly clean sides are attained and is made from a light aluminium alloy. One inlet and one exhaust valve are provided per cylinder, operated by an overhead camshaft totally enclosed in an aluminium case much in the same way as on the "Lion" engine. Two Claudel-Hobson carburettors supply the mixture. The lubrication is provided by a pressure pump driven off the camshaft vertical drive shaft and two scavenger pumps return the oil to the pump. The weight is 410 lb.

## POBJOY AIRMOTORS, LTD.

Hooton, Cheshire



The Pobjoy "R" (75/85 h.p.).

**S**TRIKING an entirely new note in the construction of light aircraft engines, the Pobjoy "R" engine has perhaps proved of greater interest to light aircraft constructors than any engine for many years. When introduced it at once became the cynosure of all eyes by virtue of the fact that it was probably the first light radial air-cooled engine to be run at a normal crankshaft r.p.m. of 3,000, and certainly the first of its horse-power to achieve a power weight ratio as low as 1.8 lb./h.p.

Since its first appearance in the King's Cup race of 1931 no very great modifications have been found necessary, and the engine itself has steadily increased in favour not only in England but in almost every country of the world. Its low power weight ratio of 1.8 lb. per h.p. at normal power or 1.59 lb. per h.p. maximum power, very naturally gives the aircraft designer more scope than with heavier engines, or, alternatively, increases the performance of existing aircraft. It is a seven-cylinder radial air-cooled engine having a bore and stroke of 77 mm. and 87 mm. respectively, thus providing a total swept volume of 2,835 c.c. Its normal power output at 3,000 r.p.m. is 75 b.h.p., with a maximum of 85 b.h.p. at 3,300 r.p.m. The weight without the exhaust collector, but including the gearing and airscrew boss, is only 135 lb.

The fact of it being geared is, of course, one of its most interesting features, and its 0.47:1 reduction allows the use of an efficient airscrew large enough in most cases, particularly in that of single-engined tractors, to throw the slipstream well clear of the fuselage behind it. The crank-



case is built up of light alloy and is in four parts. The single-throw crankshaft is carried on four bearings, a plain one in front, roller ones either side of the crank throw, both of which are of ample dimensions, and a ball bearing one taking the thrust at the rear end. The master connecting rod big end carries a floating bronze bush and the six articulated rods are linked to this master rod by a patented arrangement particularly designed for efficient lubrication, a rather important point when the speed of the engine is taken into account.

The cylinders, each carrying one inlet and one exhaust valve, are of steel to which aluminium alloy cylinder heads are screwed. The valve gear is interesting, as the ball-bearing rockers are carried on specially patented brackets designed to overcome expansion troubles. Another ingenious feature which successfully surmounts troubles normally met with in engines running at high speed, is the lubrication of these overhead rockers. This is an arrangement, which has been made, whereby the rockers are both dust-proof and self-lubricating. The very neat air-screw reduction gearing is effected through a pair of robust double-helical gear wheels. The smoothness with

which this engine runs may be accounted for, not only by its perfect balance, but also to some extent by its unique hollow flywheel which serves the dual function of smoothing the engine and acting as a centrifugal filter for the lubricating oil. The oil is drawn from the tank in the fuselage by a pump and then delivered to the engine through the hollow crankshaft via the front cover. By this means both the big end bearing and the cam drum are supplied with oil under pressure and the other bearings are splash lubricated.

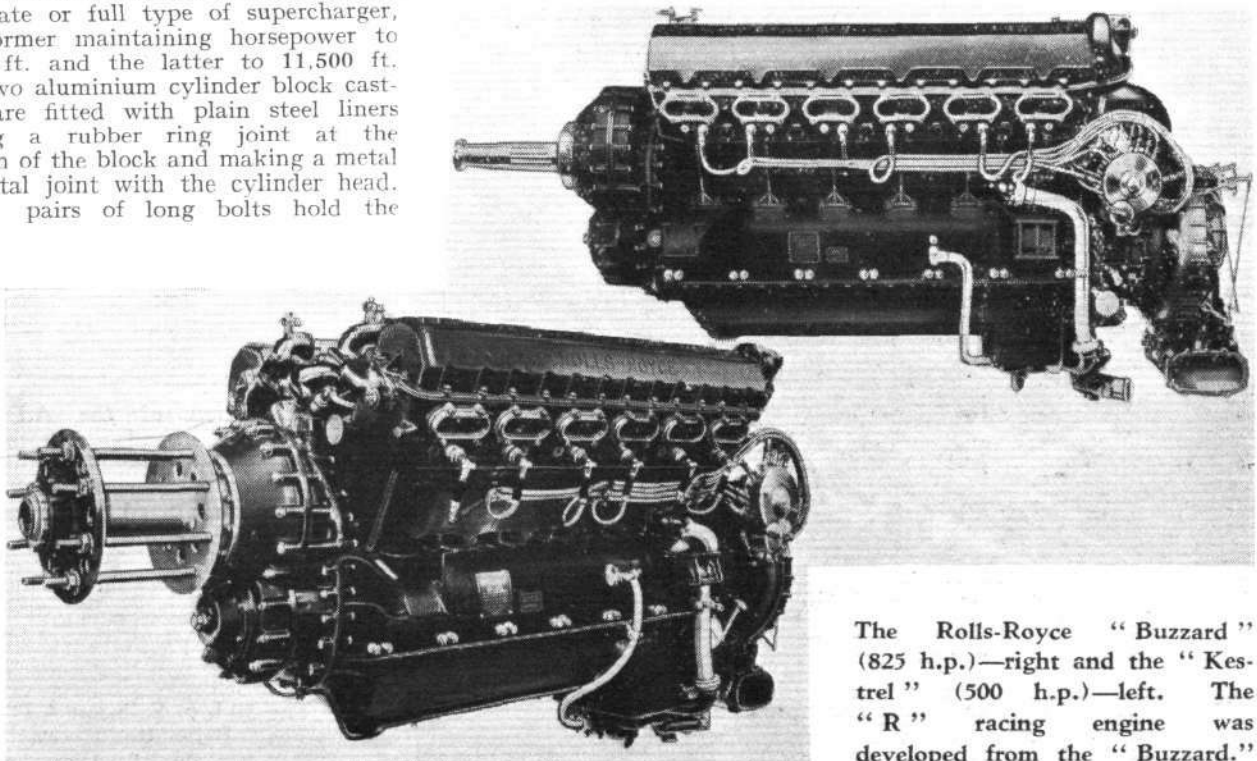
The ignition arrangements consist of a pair of B.T.H. magnetos firing the sparking plugs through separate high-tension distributors. A Claudel-Hobson carburetter supplies the mixture and a Kigas dope system is usually incorporated. Yet another valuable feature of this engine is the hand-starting mechanism. This is of the ratchet type, which disengages automatically immediately the engine starts to fire, and aircraft as, for example, the Monospar, find this fitting invaluable. It is light yet very effective and easy to work, and few things are more desirable on a modern aircraft than a means of starting the engines from the cockpits.

## ROLLS-ROYCE, LTD. Derby

**C**REDIT for winning for Great Britain not only the Schneider Trophy, but also the World's Speed Record, lay with a production of the Rolls-Royce factory, and for this reason there can be no one in the slightest bit conversant with the performance of aircraft engines, who does not already know of its excellence. Rolls-Royce engines have now been standardised in the Royal Air Force for a very large number of varied types of aircraft. Those in general use are the "Kestrel" supercharged engine rated at about 500 h.p. according to its type and the "Buzzard," a larger version rated at 825 h.p. at 2,000 r.p.m.

Both of these engines are of the water-cooled 60 deg. Vee type with their 12 cylinders arranged in two blocks of six each side. The "Kestrel," which was previously known as the "F" type, was primarily designed for high performance aircraft of the single- and two-seater type and with that end in view its frontal area was kept down to a minimum. The two banks of cylinders are each cast in block form and the compact arrangement of the magnetos and auxiliaries at the rear end, and of the gearing at the front end, all help to achieve this object. Various ratios of gearing can be supplied, as well as at least two different compression ratios. Alternatively, any of these combinations can be fitted with a moderate or full type of supercharger, the former maintaining horsepower to 3,000 ft. and the latter to 11,500 ft. The two aluminium cylinder block castings are fitted with plain steel liners having a rubber ring joint at the bottom of the block and making a metal to metal joint with the cylinder head. Seven pairs of long bolts hold the

cylinder blocks to the crankcase and these bolts pass through aluminium tubes in the water spaces of the blocks. Each cylinder is fitted with four valves, seating on screwed-in aluminium valve seats. The pistons are aluminium alloy with three rings above the gudgeon pin and one ring below. Connecting rods of "H" section are machined from nickel steel and there is one forked rod and one plain rod to each crank pin. The crankshaft is of the six-throw type of nickel-chrome steel machined and ground all over. The crankcase is built up of two castings of aluminium alloy, the upper half carrying the seven crankshaft bearings, the bottom half being bolted to it on a plane slightly below the crankshaft. A camshaft having a separate cam for each of the four valves of each cylinder is housed on the top of each cylinder block casting. Its bearings are duralumin forgings bolted on to the casting. Both camshafts are bevel driven from the rear end of the engine and the complete valve actuating gear is enclosed in a cast aluminium cover. All the auxiliary gear drives, including that of the valve gear, are taken through an extension shaft from the rear end of the crankshaft. Two horizontal lay shafts for the magnetos are driven from a vertical shaft which also drives the camshaft drive shafts



The Rolls-Royce "Buzzard" (825 h.p.)—right and the "Kestrel" (500 h.p.)—left. The "R" racing engine was developed from the "Buzzard."

through bevel gears. All the auxiliary gears are contained in a separate casing at the rear end, while in the same position a worm gear hand-starter shaft, to which a handle can be attached from either side of the engine, is fitted. The airscrew reduction gear is of the spur wheel type and both the pinions and airscrew shafts run in roller bearings. The whole of this reduction gear is in a separate casing bolted to the front of the crankcase. The mixture is supplied by two Rolls-Royce carburettors fitted between the cylinder blocks and in the case of the Schneider engine a special Venturi form of air inlet accounted for a large proportion of the increased power obtained from this engine. Lubrication is of the normal dry sump type, the oil being pressure fed direct to the

crankshaft and thence to the crank and connecting-rod bearings. B.T.H. magnetos supply the current to the sparking plugs and two of these are fitted either side of the rear end of the engine. The Rolls-Royce "Buzzard" is an enlarged edition of the "Kestrel" and it is from this that the "R" type of racing engine which was used in the Schneider Trophy seaplanes was evolved.

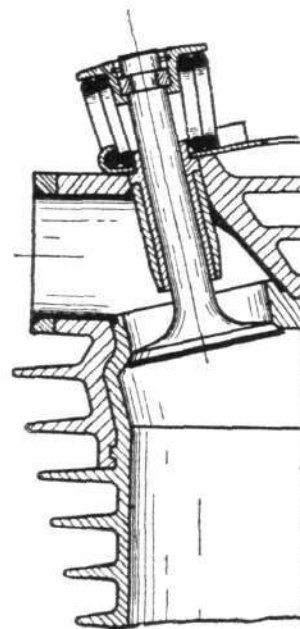
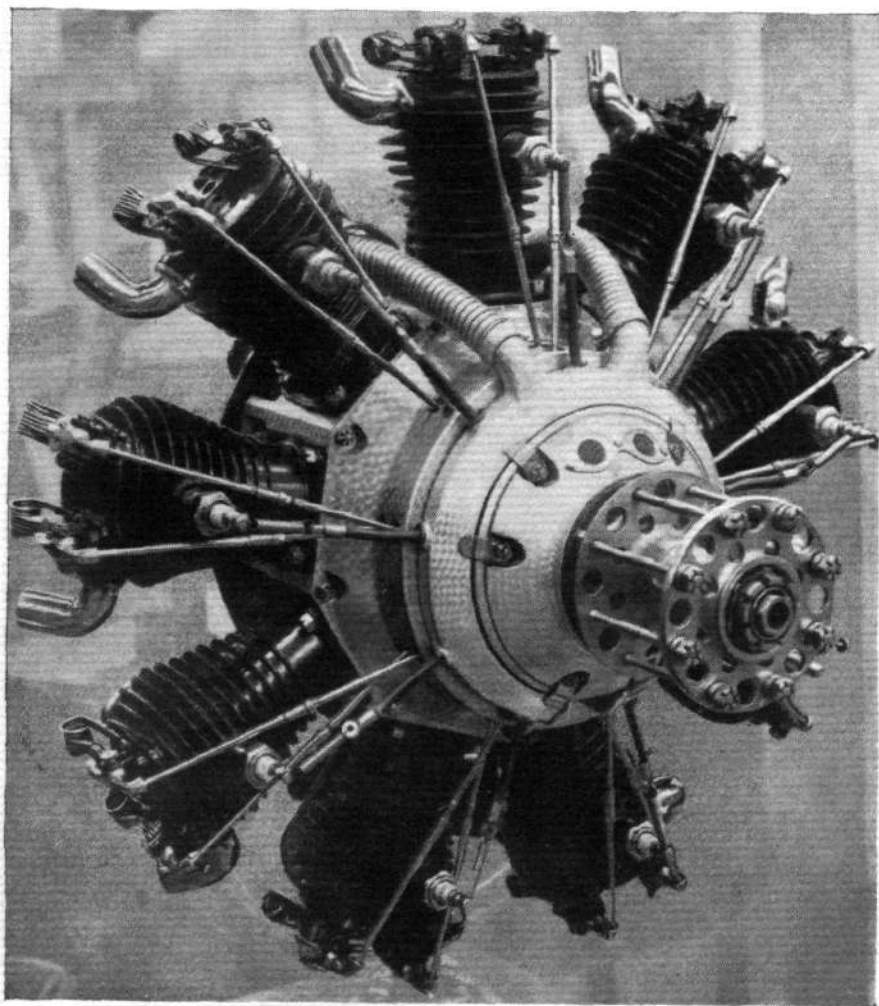
A matter of the greatest importance and interest is the recent notification that the "Condor," the prototype of the "Buzzard," has successfully been modified to burn heavy oil, and in this form has now passed its Air Ministry tests. The fuel injection is effected by one pump per cylinder, the ignition being obtained through the compression temperature of the charge itself.

## BRITISH SALMSON AERO ENGINES, LTD. New Malden, Surrey

**A** NINE-CYLINDER, radial, air-cooled engine, the Salmson A.D.9 is, as may be imagined, particularly smooth running. With a bore and stroke of 70 mm. and 86 mm. respectively, its swept volume is 2,980 c.c., delivering 50 h.p. at 2,000 r.p.m. It is understood that developments are in hand to run this engine at considerably higher revolutions, when of course the power will be increased accordingly. Reduction gearing is being fitted to this new model, shown as the A.D.9R. at Paris, in order that more efficient airscrew dimensions may be utilised. The crankcase is of the split type liberally ribbed internally and externally. The cylinder construction is somewhat unusual, in that the aluminium head is cast directly on to the steel cylinder in the form of a poulitice. This arrangement allows of the valve seatings being formed integral with the cylinder, while the inlet and exhaust extensions are welded direct to it. It will be seen, therefore, that this aluminium head is not in direct contact with the gases at any point, nor do any stresses fall upon it. There are two valves per cylinder operated by push rods and rockers and retained on their seatings by double "hair-pin" springs. The pistons are of aluminium alloy, each with three rings. The connect-

ing rods are of steel and tubular cross section, there being one balanced master rod and eight auxiliary rods. The crankshaft is in two pieces, the forward web and crank pin being integral with the forward part, both parts being built up of chrome nickel steel. It is carried on three roller bearings, one in the extreme front, one in front of the throw and one at the back.

Lubrication is provided by two gear type oil pumps mounted on the back of the engine. The oil is delivered to the hollow part of the crankshaft, where it is fed under pressure, via the big ends, through the hollow connecting rods to the nine gudgeon pins. The valve timing gear is lubricated by splash. The valve gear rocker pins are hollow and of large diameter, thus forming reservoirs which may be filled when necessary. A Zenith carburettor delivers the mixture to a collector on the back of the crankcase, whence it is distributed to each cylinder. The pipe through the carburettor to the collector being jacketed by the warm oil on its return to the oil tank. This has the double effect of cooling the oil and pre-heating the mixture. A hand-turning gear is provided on an extension of the crankshaft at the rear end, which can be used with a cross handle if desired.



A section of the A.D.9 cylinder head, showing clearly how the aluminium cooling plaster is locked around the head of the steel cylinder.

The 50-h.p. Salmson A.D.9. The British-built engine has dual ignition.



# Accessories

**I**N the following supplement we give very brief details of some of the more important aircraft accessory firms and their products. The number of these firms has grown enormously during the last two or three years and we have therefore had to select a representative number of firms rather than to attempt to deal exhaustively with them all. In order to prevent this supplement becoming too unwieldy it has been necessary to curtail the amount of space given to each firm to a rather small amount. Foreign buyers should look upon this supplement rather as an introduction to the suppliers of aircraft materials and parts, than as a form of Buyers' Guide.

## AERODROME EQUIPMENT

*The En Tout Cas (Syston) Co., Ltd.,  
Syston, Leicester*

**V**ERY well known indeed for their work in connection with aerodrome surfacing and preparation, this company specialises in mole draining work and is thoroughly equipped with every form of mechanical levelling and grading tool. Mention may be made of the 57-acre aerodrome extension recently concluded for the R.A.F. at Sutton Bridge. In jobs like this it has been found necessary to work to a very strict schedule in order that the grass seed may be sown at the correct time and in this job in particular large quantities of soil had to be moved in a very short time, but the mechanical tractors of the company were well able to cope with this, the job being completed to the entire satisfaction of the Air Ministry. As well as this aerodrome work, the company specialise in the design of clubhouses, light steel or woodwork hangars and lock-ups, for privately owned aircraft. Their work in connection with both hard and grass tennis courts is almost too well known to need mention, and their long experience of bowling greens has enabled them to develop a unique technique in connection with draining.



Reading Aero Clubhouse built by En Tout Cas Co., Ltd.

*The "Lamella" Hangar under construction at Heston airport.*

*G. Ellis & Co.,  
Hackney Wick, London, E.9*

**G.** ELLIS & CO. have become known for the supply of hangars suitable for efficient housing of sailplanes and gliders.

A very practical hangar of theirs is the one designed by the London Gliding Club for housing their machines at Dunstable. This wooden hangar was supplied in parts by the company in such a manner that it was possible for the club members themselves to erect it. Of course, hangars like these are not the only form of building which this company can supply, and those who require bungalows or portable buildings of any sort cannot do better than investigate the range which they have to offer. When buildings supplied in sections are purchased it is often found that the sections do not go together easily, causing endless trouble and often expense. In the case of Ellis hangars, however, this has never been found, and the hangar at Dunstable caused the members not the slightest trouble from beginning to end.

*Horseley Bridge & Engineering Co.  
Ltd., Birmingham*

**B** RITISH rights of the Junkers "Lamellendach" system have now been secured by the Horseley Bridge & Engineering Co. and already they have erected a hangar of this type at the Heston Airport. This is a large building 150 ft. long by 80 ft. wide, with an effective door opening of 62 ft. wide by 18 ft. high. Despite this size, however, the work was completed, except for minor fittings, in a period of three weeks. The whole of the structure is built from four standardised units, all of which are standard steel pressings stamped from comparatively thin steel. The covering of the hangar may be sheets of corrugated asbestos or any other desired material.

## AIRCRAFT COMPONENTS

*Aircraft Components, Ltd.,  
Cheltenham, Gloucester*

**S** INCE entering the aircraft field fairly recently, this company, Aircraft Components, Ltd., of which Mr. G. H. Dowty is the Managing Director, has already made a name for itself. One of the most interesting of his products is his Shock Absorber Strut. This strut is of all-metal construction and uses steel springs. It is particularly light and has a very small frontal area due to the ingenious arrangement of the spring elements. The springs are coupled in parallel, two or three spring units being placed vertically, one above the other, so that the spring load is divided equally between these units and in this way the total length of the strut is used for housing the springs. These struts

are manufactured with or without oil dash pots, but in all cases the spring recoil is checked. Large numbers of manufacturers are finding it their best proposition, from all points of view, to buy their struts from this company in preference to manufacturing their own.

**The Airscrew Co., Ltd.**  
Weybridge, Surrey

**M**AINLY manufacturers of wooden airscrews, but, at the same time maintaining an impartial attitude to the question of metal *versus* wood, this company concentrates chiefly on the latter material, and advise this as being the ideal material for withstanding the airscrew conditions. Wood, for example, never fatigues; its weight may be even 50 per cent. less than a metal airscrew and its cost quite likely 15 per cent. less. During recent years the life of a wooden airscrew has increased enormously, and airscrews are now so well constructed that given proper care and attention they may be said to last indefinitely. This is partly due to improvements in manufacture and partly to the elimination of flutter, an ill from which most airscrews suffered for many years. The company manufactures a very large percentage of all the airscrews used, not only in Service aviation but also in civil aviation, and they export in large quantities to all parts of the British Empire and a large number of other countries. Engine test brakes have also received a great deal of their attention.

**Brown Bros., Ltd.**  
Great Eastern St., London, E.C.2

**B**BROWN BROS. are manufacturers of every conceivable kind of aircraft fitting conforming to A.G.S. and other standard specifications. The majority of these, like the S.B.3 Fork Joint, can be made in stainless or mild steel, or duralumin where this is specified. At Paris the majority of the British aircraft and British engines will be using parts supplied by Brown Bros., and in particular all the A.G.S. fittings on the Hawker "Hart" being

shown in the Salon came from this firm. It is impossible to enumerate the parts which can be supplied, but they include such things as nuts, bolts, washers, turn buckles, fork ends, petrol cocks, valves, pipe couplings, bonding clamps and cleats. The steel parts are treated with cadmium or zinc coating, that is, if they are not stainless steel, in order to prevent corrosion, while those parts manufactured in duralumin are anodically treated for the same purpose.

**Rubery Owen & Co.**  
Darlaston, S. Staffs

**A**LL kinds of aircraft components, and particularly those made from alloy steels, are produced by this very old-established company. There is very little in the way of components which the company does not produce, and everything, such as bolts, nuts, turn buckles, eye-bolts, shackles, pins, washers, fork ends, streamline wires and A.G.S. parts, are to be found in their lists. Stainless steel has recently come into increasing favour, particularly for seaplane work, and it is in this material that a very large number of these parts are turned out. Those in ordinary steel are protected against corrosion by cadmium plating. Duralumin parts are also made.

**Burley, Ltd.**  
192, Tottenham Court Road, London, W.1

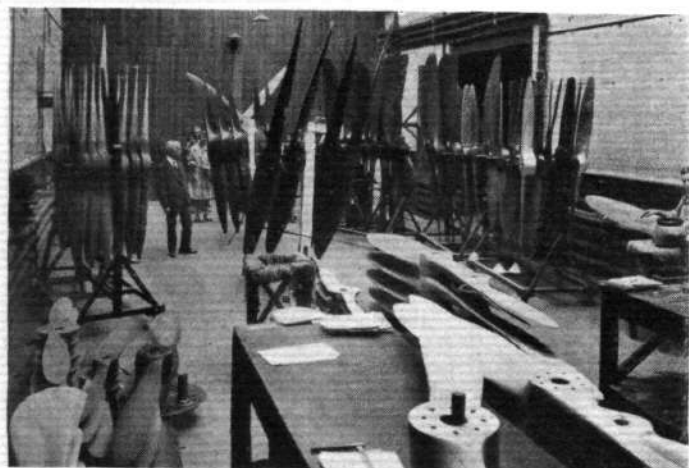
**M**OTORLESS flying being recently revived has created a demand for Shock-absorber cord of the type suitable for launching gliders and sailplanes, and this firm specialises in the production of this cord. Their range also includes almost every other component, not only for gliders but also for power-driven aircraft, which has rubber in its composition. For example, petrol, oil and pitot-tubing; shock-absorber cords for undercarriages; rings, balls and discs, for undercarriage struts; all have received attention by them and can be supplied in great variety.

**Fairey Aviation Co., Ltd.**  
Hayes, Middlesex

**F**AIREY metal airscrews have not only enabled pilots to win races like the King's Cup, but were also chosen to transmit the enormous power developed by the Rolls-Royce engines in the special Supermarine seaplanes which won the Schneider Trophy Contest and which secured the World's Speed Record. A metal airscrew has a great number of advantages, not the least of which is, that it can be pressed to shape again should it become distorted through hitting the ground. It is then unnecessary to buy a new airscrew as would be the case with a wooden one. Furthermore, metal airscrews are not subject to distortion and shrinkage due to variations in atmospheric conditions. The standard model, a single forging of duralumin, is profiled to the desired aerofoil section by a shaping machine, and the central twist is then obtained by means of a hydraulic press, the setting of the outer portions being finally done with a twisting machine. The latest development of this form of airscrew is the adjustable-blade type. With this, the blades are mounted in a circular boss, and can then be rotated individually to give any desired degree of pitch.

**Vickers (Aviation), Ltd.**  
Broadway, Westminster, London, S.W.1

**V**ICKERS, of course, make a very wide range of aircraft accessories, so much so that it would be quite impossible to deal with a representative selection of their products in the small space at our disposal. It must suffice, therefore, to describe one of their most interesting aircraft components. The Vickers Oleo-Pneumatic Strut is an ideal form of shock absorber incorporating a very effective oil brake, or damper. The unit consists of an air chamber, which has a piston projecting through a gland at its lower end. Compressed air acting on the piston carries the load and provides the springing. The oil brake takes care of the landing shocks and provides the necessary damping to prevent bouncing. The compression curve of air is very flat for approximately the first one-third of the

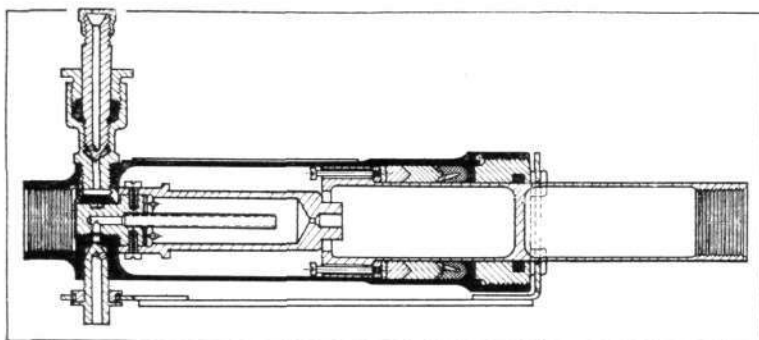


Wooden Airscrews in the Workshop of The Airscrew Co.



The new, adjustable pitch, all-metal, Fairey Airscrew.





A Section of the Vickers' Oleo-Pneumatic Shock Absorbing Undercarriage Leg.

travel. This is a good feature for aircraft, as it provides good taxiing characteristics, there being only a small increase of load for a good piston displacement, and the rapid increase of load which takes place towards the end of the compression provides a great measure of lateral stability. This design of shock absorbing strut provides an extremely light and efficient method of absorption of a good amount of energy.

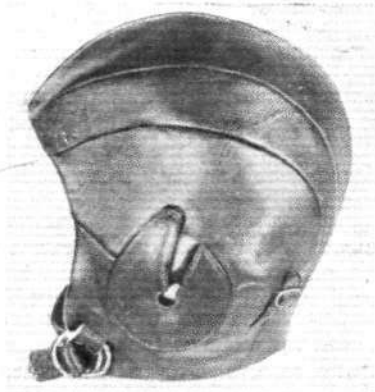
Exhaustive reduction of air pressure may give rise to lateral instability, but even with the piston standing at half-travel when the machine is stationary, the units will give satisfactory service and the full hydraulic damping effect will be available on landing.

## CLOTHING AND PARACHUTES

**Burch's**

33, Bedford St., London, W.C.2

**B**URCH'S are R.A.F. tailors who specialise in uniform outfits for both the Regular, Reserve, and Auxiliary Units of the R.A.F. Their prices are very low and officers who require kits are well advised to investigate their stock. Pilots who do a lot of flying in open aircraft should undoubtedly see their new helmet, which is sold under the name of the "Binley Speed Helmet." This is of chrome leather and its special design makes it peculiarly suitable for use during prolonged flights. Its design allows of an exceptionally close fit, and is therefore to be advocated when weather conditions are bad.



A really comfortable helmet from Burch's.

**Gieves, Ltd.**

21, Old Bond St., London, W.1

**G**IEVES are, of course, very well known indeed as naval and military tailors. It may, perhaps, not be appreciated that they supply in addition, every form of flying clothing and such things as jewellery, like brooches and links, either engraved or having a raised R.A.F. badge, which may be desired finished in enamel of appropriate colours. Squadron brooches, cigarette cases with crests on, and, in fact, every form of similar article. Their new flying helmet is advertised as the "perfect fitting helmet," and one of its chief points is that it is fitted with the Mallock-Armstrong ventilated protector. This gives full ventilation to the ear drum, thus preventing overheating, and, while giving entire relief from excessive external noises, still enables the pilot to hear perfectly through the ear-phones.



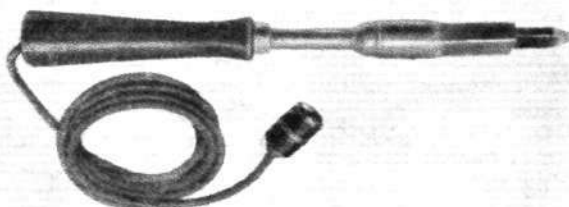
A Cigarette Case by Gieves, Ltd.

**Irving Air Chute of Great Britain, Ltd.**

Letchworth, Herts

**S**OME types of Irvin parachute produced are the Quick Connector, Seat and Back Packs, Training Outfit, and the Caterpillar Chute, the latter being specially designed for use in light aeroplanes.

The Seat Pack is commonly used by pilots, for in its position it is not an encumbrance and it also serves as a cushion. The Back Pack is convenient for observers and passengers generally. If they have to move about the aircraft in flight it does not impede them. In cabin aircraft the Back Pack, with



The "Solon" electric soldering iron, supplied by Brown Bros.

a soft pad attached, has been specially adapted for both pilot and passengers. The pack remains permanently in the seat, the harness being simply adjusted when the crew enter the cabin.



The "Quick-Release" Harness for the Irvin Airchute.

For observers and other members of a military crew, whose duties prevent a pack being worn conveniently, the Quick Connector is suitable. This type can be detached from the harness in a second, and re-attached just as quickly when required.

The Training Outfit conveys its particular purpose, and consists of a Back Pack and Quick Connector.

The standard harness with Irvin types is now the Quick Release type. This embodies an ingenious box fitting, which locks all the ends of the harness centrally and releases them instantaneously when the face of the fitting is turned and pressed or punched by hand.

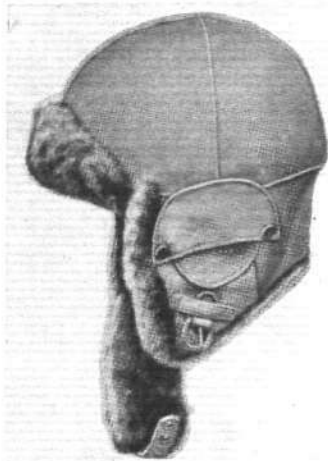
By the development of the Quick Release, naval airmen have been able to equip themselves with a parachute with confidence for the first time, for it means that when forced to descend in the sea they can cast off the whole parachute equipment just before being submerged. The Fleet Air Arm is now supplied with Irvin parachutes, embodying the Quick Release Harness.

Some of the countries using Irvin Airchutes include, besides Great Britain:—Turkey, Belgium, Germany, Poland, Russia, Yugoslavia, Denmark, Rumania, Japan, Siam, Sweden and Greece.

**D. Lewis, Ltd.**

124, Gt. Portland St., London, W.1

**M**AKERS of all forms of flying and motoring clothing, such as "Sidcot" suits, leather jackets and coats, helmets, goggles, boots, etc., this firm is one of the best known. Their flying suits are made in heavy weight gabardine, fleece lined, with detachable collar, also being fitted with a Zip front, and having both leg and breast pockets. Their "Kestral" aviation suit has particularly been designed to overcome the difficulty of having to cut such suits longer in the body than is actually necessary. In the "Kestral," the tunic or body garment is actually independent of the trousers and both can be worn separately. All fasteners are made with rust-proof, open-ended Zippers, and when complete it is in every way like a one-piece garment.



A fur-lined helmet from D. Lewis.

**S. Lewis**

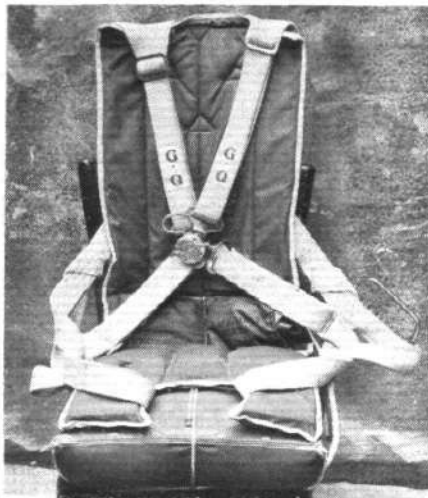
27, Carburton St., London, W.1

**S**PECIAL clothing for pilots, particularly those who fly in aircraft with open cockpits, is undoubtedly a matter, the provision of which, should be handled by experts. Correct, comfortable, and warm clothing is an absolute necessity if the pilot is to remain efficient and reasonably fresh at the end of a long flight. S. Lewis is one of these expert firms, and they supply helmets, overalls and all kinds of flying kit, not only to pilots in the R.A.F. but also to those in civil aviation.

**Gregory-Quilter Parachute Co.**

50, Gresham St., London, E.C.

**A** NEW-COMER to the parachute market is Mr. Raymond Quilter, who, in collaboration with Mr. Gregory, has produced a parachute designed in every way for the private owner. Mr. Quilter himself is a pilot of great ability and wide experience, and has also made a very large number of parachute drops. As a result of his experience he has designed this parachute, which is claimed to eliminate drawbacks usually attendant on parachutes from the private owner's point of view. In its design



The comfortable "G.-Q." parachute

it is normal, with a very quick-acting pilot chute and a canopy which has very definite non-swinging properties. A point which appeals to the private owner is comfort. This is catered for by a "sorbo" pad on the top of the pack frame, also by the provision of a back pad interposed between the back of the wearer and the webbing of the harness. The harness itself is affixed to the wearer quite easily after taking his seat in the machine, and of course has a quick release. The webbing is soft, and therefore does not chafe the shoulders, while the base of this back pad is fitted with two convenient little pockets, one carrying a lifebelt and the other the packing pins and instruction booklet.

The canopy has been designed with particular attention to the elimination of swinging, and the Gregory-Quilter parachute, although it does not utilise internal rigging, is immune from swinging under any conditions.

**E. B. Meyrowitz, Ltd.**

1A, Old Bond St., London, W.1

**M**EYROWITZ are the makers of goggles used by almost every record-breaking pilot of recent years. One of their most recent developments is the introduction of ground safety-glass lenses, wherein the upper and lower portions are tinted, thus leaving a clear streak for the normal line of



The latest Meyrowitz goggles.

vision. This streak enables the wearer to see perfectly, but at the same time the tinted areas protect him from the glare of the sun or from reflecting surfaces like water. We ourselves have tried these goggles and can vouch the fact that the protection from glare is an extremely comforting feature. Their No. 10 goggle is also a very well-known type, and in connection with this it should be noted that the design is covered by patent No. 36470. Meyrowitz goggles are surrounded with a large and comfortable sponge rubber pad, which fits closely to the face and entirely excludes all draught from the eyes.

**DOPE, PAINT AND VARNISH**

**Cellon, Ltd.**

Kingston-on-Thames

**H**ISTORICALLY this firm goes back to the earliest days of aviation when everyone was searching for a means of tensioning the fabric on aeroplane wings. Since those days Mr. A. J. Wallace Barr, the Managing Director, has steadily improved the technique of the manufacture of dope, and every form of dope, whether for use in heated shops or in the open air, can be supplied by his firm. Their scheme C.X. is a normal nitrate cellulose dope for use indoors where properly heated and ventilated shops are available. C.X.2 is the appropriate scheme for use under adverse conditions where unheated shops have to be used or where work has to be done in the open. Cellon dope is, of course, used by a very large number of aircraft constructors, and the firm has received an Air Ministry contract for the current year. Dope, however, is not the only product of the firm, as their "Cerric" cellulose lacquers and synthetic finishes are widely used as protection against corrosion for every form of metal work in aircraft and seaplanes.

**Nobel Chemical Finishes, Ltd.**

Slough, Bucks.

**A** SYNTHETIC finish called "Dulux" has recently been introduced by this firm which possesses great flexibility so that it is suitable for finishing work on any aircraft or motor car. This finish conforms to the Air Ministry Specification D.T.D. 56A and is particularly recommended for application to duralumin parts or metal surfaces which have been cadmium plated. This finish gives very great protection from the weather and other corrosive matters over the greatest possible period of time, tests having proved it to be superior in durability, hardness and flexibility to the older types of oil paints and varnishes. The "Dulux" range of finishes are air drying and made to Specification D.T.D. 62; there are stoving finishes



for application by brush or spray. Fabric dopes and "Belco" finishes are also products of the company for the fabric and metal parts of aircraft.

#### **Titanine-Emaillite, Ltd.**

166, Piccadilly, London, W.1

**TITANINE** Satin Finish has been produced in order that the finished fabric shall be particularly smooth, and this particular form of dope has already found great favour not only in this country but also in America where the recent World's Land Speed Record of 296.3 m.p.h. was obtained by a "Gee Bee" racing monoplane doped with this satin finish. This satin finish scheme consists entirely of cellulose materials and the constituent parts are so balanced as to ensure a very high degree of durability. The company was first established in 1915 under the name of the British Aeroplane Varnish Co., but so great has their business become that they now have factories not only in this country but in the U.S.A., Germany, Italy and Holland. Besides this satin finish already mentioned, they supply every type of dope and finishing varnish suitable for use not only on fabric but also on plywood and metal. Petrol, oil and dope resisting paints are other aircraft lines of theirs, while a special lacquer is produced which is particularly resistant to the corrosive qualities of seawater.

## FUEL, OIL AND GREASE

#### **Anglo-American Oil Co., Ltd.**

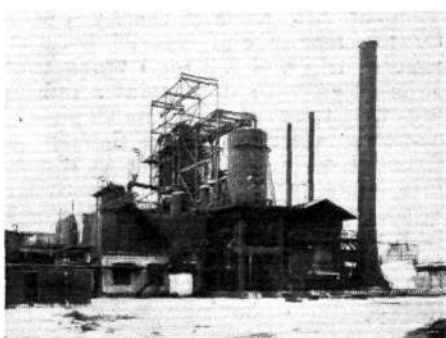
36, Queen Anne's Gate, Westminster, S.W.1

**ANGLO-AMERICAN** market the well-known "Pratts" brands of fuels and oils in this country, and are distributors of the international brand of aviation oil and fuel—"Stanavo." Aero engines are often somewhat sensitive to changes in the quality of fuel and oils, and absolute uniformity is therefore imperative. "Stanavo" oil, conforming to Air Ministry specification D.T.D. 109, can be obtained in all European countries, Canada and the United States on demand, and at more remote points at request. This organisation ensures that the standard of operation of aircraft engines in different parts of the world can be maintained with absence of mechanical failures due to the use of unsuitable fuel and oil.

#### **Alexander Duckham & Co.**

16, Cannon St., London, E.C.4

**N.P.5** aero engine oil is produced by Alexander Duckham & Co., and is on the Air Ministry's approved list. This oil is very well known, and is stocked at every civil aerodrome in the country. Moreover, it has the



The Pratt's refinery at Fawley, Hants

approval of every British aero engine maker. It is the result of long and careful study on the part of the firm's chemists and accedes in every way to the requirements of the Air Ministry specification for oils of this type. No user need have any qualms that N.P.5 will not stand up to its work, whatsoever the conditions in which it is to be performed. Another and interesting product of this firm is their S.U.3 cleanser. This is a special preparation for cleaning aircraft, and is largely used throughout the country; it is particularly suitable for doped or painted surfaces, and although quite harmless to any form of protective coating, it yet removes all grease and oil in a very ready manner. Bracing wires and similar exposed parts need protection of some form, and Duckham "Immutol Slush," which is prepared in five different colours, is excellent for this purpose. Rusted bolts are often a source of trouble, but the nuts from these generally give way to a few drops of Duckham's "Easing Oil." For the lubrication of controls, rocker arms, etc., at high altitudes Duckham's "Anti-freezing Grease," which has a set point of minus 50 deg. C., is the sort of thing one should use.

#### **National Benzole, Ltd.**

Buckingham Gate, London, S.W.1

**NATIONAL Benzole** Company is the distributing organisation for the purchasers of British benzole, and retails motor spirit under the name of "National Benzole Mixture." This mixture is suitable for all types of combustion engines, and has met with considerable success in the aviation market. The King's Cup Race of this year was won by a machine using this mixture, proving that it is equally as good for racing as it is for touring or general flying. As its name implies, it consists of a high-grade petrol with an admixture of British Benzole, giving the properties required for a clean and powerful fuel without necessitating a special mixture to be made at the time of refuelling the aircraft. National Benzole is produced from British coal by the coal, iron, gas and steel companies of the country, and its production thus gives employment to thousands of our own people.

This mixture of petrol with British benzole replaces the old "20/80" mixture and therefore gets just that little extra amount of power out of the normal engine, or alternatively is suitable for high compression engines.

#### **Shell-Mex and B.P., Ltd.**

Kingsway, London, W.C.2

**A** PART from their well-known fuels, "Shell" and "B.P.," this company market a lubricating oil whose properties make it peculiarly suitable for use in aircraft engines. This is called "Aero Shell," and was originally designed to meet the requirements of aero engines. Prolonged tests have shown that it possesses excellent lubrication properties and cleanliness; moreover, it continues to function satisfactorily under the sustained stress met with in this type of engine. The effect on this is that efficiency is maintained at high speeds and on long flights. Likewise, the life of the engine is considerably lengthened. The characteristics provide a wide margin of safety under prolonged conditions of heating, which destroy the essential properties of ordinary oils. "Aero Shell" is very stable and can run for very long periods, as it stands up without deterioration to prolonged high temperature. It has been used on a large number of long-distance records, and also is widely used by Imperial Airways. Its peculiar properties make it equally valuable for use in high-speed-car engines and motor cycles.

#### **Vacuum Oil Co., Ltd.**

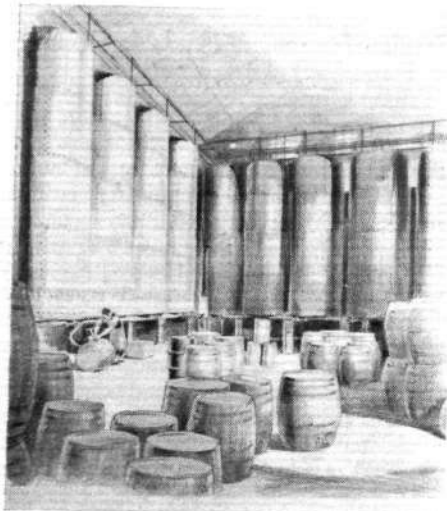
Caxton House, London, S.W.1

**KNOWN** all over the world, the lubricants marketed by this company for aviation use include Mobiloil Aero H, Aero W, and Mobilgrease. No. 3 Aero W is a grade most suitable for popular light aircraft engines, while Mobilgrease No. 3 is particularly suitable for overhead valve rocker lubrication, as it is designed to withstand the most exacting conditions likely to be found in such work. One of the advantages of using Mobil-oil products is the world-wide distribution effected by the company, and their products can be obtained at all the most important aerodromes throughout the world. Their oils are also, of course, recommended by all prominent engine manufacturers.

#### **C. C. Wakefield & Co., Ltd.**

Wakefield House, Cheapside, London, E.C.2

**NUMBERING** many different kinds, Wakefield oils must run into many hundreds, but the grades with which airmen are particularly interested are "Castrol R," "XXL," and "Aero C." "R" is a castor base oil for high performance engines, while the other two are both blended from mineral oils. "XXL" is a grade stocked by all aerodromes and garages and is recommended for use for a large number of motor-cars and motor-cycles as well as for aero engines. Castrol oils are produced under conditions of rigorous cleanliness and inspection, and the chemists in the laboratory at Hayes or Liverpool maintain the strictest control, not only of the current production, but are also engaged on research to improve existing oils or to devise new ones.



A blending room in the "Castrol" works at Hayes, Middlesex.

Uniformity is, of course, of paramount necessity in a lubricating oil, and tests are taken from all batches to ensure that they conform in every respect to the standard. Many oils tend to become dirty with use, and often to deteriorate chemically. At the high temperatures under which they normally have to be used in engines they tend to oxidise, but special precautions are taken in the preparation of Castrol oils to limit the amount of oxidation to the minimum, and every batch of oil is carefully tested before delivery, for this purpose.

Many other tests are also made. There is, for example, the "pour test," which determines the temperature at which the oil will cease to flow, and is therefore a check against gumming up in cold weather. At the same time it is necessary to ensure that the oil remains thick enough at working temperatures, and for this purpose there is a test called the "viscosity test" which measures the degree to which the oil will thin down when it becomes hot.

## GENERAL ACCESSORIES AND EQUIPMENT

**Air Log Co., Ltd.**

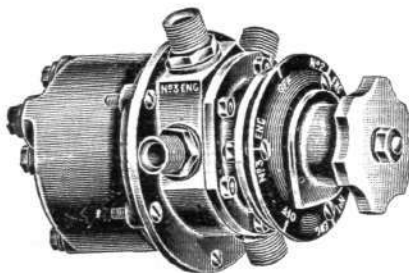
193, Elgin Terrace, London

INSTRUMENTS being produced by this company may be worked either by a pitot head or by a venturi tube.



The Air Log.

The Air Log itself is usually worked by the former and records both the time of trip and the total flying time. It is fitted with dual pointer indicating the time of trip, moving in a clockwise direction round the circumferential scale. This scale is divided into hours and tenths of an hour, and a peculiar feature of the instrument is that when this trip pointer is returned to 0, the spring motor is automatically re-energised, thus obviating the necessity of having to do more than cancel the trip reading when finished. This form of air log does not start to function until the machine is in the air, and it therefore greatly assists accurate cross-country navigation. The engine log type is operated by a venturi tube placed directly behind the airscrew, and it therefore records the total time during which the engine is running, thus eliminating the necessity for guessing the time of taxiing or running up and ensuring overhauls at regular intervals. Such instruments are also valuable for time checking on machines used by flying schools and joy-riding concerns.



A Bonnell Switch.

**D. H. Bonnell & Sons, Ltd.**

46, Osnaburgh Road, London, N.W.1.

ELECTRICAL equipment for modern aircraft is rapidly becoming a more and more complicated system, in exactly the same way as is that of ocean-going liners. Services of every conceivable kind are now controlled by electricity, while the advent of wireless has made careful bonding and screening necessary throughout the aircraft. All these factors tend to increase the number of electrical fittings and equipment required, and the firm of Bonnell supply everything of this nature, to do with lighting, wireless, ignition and bonding, as well as cockpit lamps, dimmers, sockets, plugs, cable clamps, adapters, lugs, joint boxes and screened ignition.

**British Power Boat Co.**

Hythe, Southampton

EVERY form of motor-boat is turned out by this company. Their 16-ft. motor launch called "The Sea Trump" type, is widely used by the coastal stations of the R.A.F. for general tender work, and has also been fitted as a tanker with a capacity of 300 gallons. It has an 8/28



British Power Boats for the R.A.F.

four-cylinder engine which gives a speed of 23 m.p.h. The larger craft are of equal, if not more interest, and among these is the 37-ft. 6-in. R.A.F. seaplane tender fitted with two engines of 100 h.p. each. The speed is high, as much as 25 knots full out, so that it is obvious that it should be of great use for general seaplane tender work. Boats of this type have proved to be excellent sea boats, even at full throttle, and have been run perfectly successfully in seas which called for a reduction in speed on the part of destroyers and other craft. Manoeuvring is particularly easy, due to the twin-screw arrangement, and in restricted waters the wheel can almost be disregarded. There are only two 6-in. levers, and these govern both the reverse gear and the engine speed. The performance is probably largely accounted for by the design of the hull. Below water the bows are Vee shaped and the under water part of the hull becomes progressively shallower, with a wider Vee throughout its length until at the stern it is practically flat bottomed. This shaped bow tends to cut a path through the water and to pile up on either side a wave, on which the flatter part of the hull rides.

**Kelvin, Bottomley & Baird**

18, Cambridge St., Glasgow, C.2

K.B.B. compasses are made in several types, but the most widely known is the K.B.B.4. This is similar to the ordinary Service type P.4, but with an improved magnetic system giving a quick, dead-beat



A K.B.B. Compass.



action. The K.B.B.3 is a smaller type designed for light aircraft, and is particularly suitable for fitting in aircraft where space in the cockpit is limited. The moving element has no card, but four direction indicators denote the four main cardinal points, N., S., E., W. A rotatable bezel ring graduated in degrees carries a pair of parallel grid wires, and is adapted for manual turning. This ring, after being set, is clamped with a knurled knob. For night flying these compasses have direction indicators, grid wires and ring scale, luminised with radium compound. In both models the moving system is very quick to get off the mark, and when deflected returns promptly to its final position of rest, with a minimum amount of over-swing, this quick dead-beat action being particularly necessary for modern aircraft. It is also claimed to be very free from disturbance due to vibration and acceleration forces.

The fundamental circumstances which led K.B.B. to introduce these greatly improved designs were (a) reduced weight acting on the pivot, (b) minimum magnetic moment compatible with absence of pivot friction effects, (c) minimum moment of inertia of damping elements and other parts of the moving system.

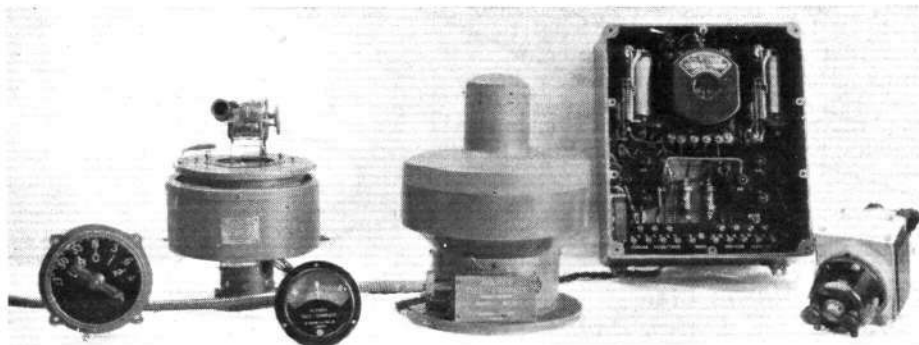
#### *Marconi Wireless Telegraph Co., Ltd.*

*Strand, London, W.C.2*

NUMBERLESS types of Marconi wireless apparatus are available for fitting to aircraft allowing the company to fit any machine for any conceivable class of duty. The Bristol "Bulldog" being shown at Paris is equipped with a Short Wave apparatus. This consists of a type A.D.25A telegraph-telephone transmitter and a type A.D.23A receiver specially designed for naval and military requirements. A single pentode type valve is used in the transmitter both for the generation of low-power oscillations at a constant frequency and also for their subsequent amplification. The result of this single valve doing the work for which two valves are normally employed is a great saving in space and weight. Reliable communication can be carried out over the ranges normally required in service without the hindrance of the trailing type of aerial. The transmitter is capable of telephone, continuous wave, or interrupted continuous wave telegraph signalling on any wave length between 90 and 130 metres. In addition to the pentode valve only one other, a power valve as a modulator for telephone transmission, is used. Two screened-grid high-frequency amplifier



**The Marconi A.D. 25 Transmitter.**



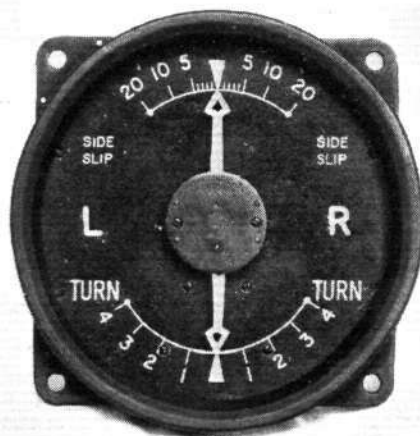
**The Holmes Tele-Compass.**

stages are used in the receiver, followed by a detector and one stage of low-frequency amplification.

#### *Reid & Sigrist, Ltd.*

*Canbury Park Road, Kingston-on-Thames*

ABILITY to fly by instruments alone has now become an absolute necessity for any pilot who wishes to be safe under all conditions. The two instruments most necessary to enable him to do this are the Turn Indicator and Pitch Indicator, that is—instruments over and above the standard ones fitted to every machine. Reid & Sigrist have had their Turn Indicator standardised not only in the Royal Air Force but also by many of the



**The Reid & Sigrist Turn Indicator.**

most important civil flying schools. It is of great interest therefore that we learn of the introduction of their new "Wide Reading Pitch Indicator." This has also been adopted by the R.A.F. and in this a special shaped tube has been designed which enables almost the whole length of the instrument to be utilised to obtain the angle from 0 to 5 deg. The readings of between 5 and 10 deg. occupy considerably less space. The luminised dial is calibrated on the left-hand side in degrees, but the right-hand side has been left plain so that the pilot can mark his own individual requirements, denoting such points as starting, climbing, gliding, etc. The total weight of the instrument is only 4 oz., while its dimensions are merely 1½ in. wide by 5 in. deep.

Exhaustive tests were carried out over a period of many months before this instrument was put into production, so that it can be used in conjunction with the Turn Indicator with every confidence that the best possible instrument flying equipment is being utilised.

#### *Smith's Aircraft Instruments, Ltd.*

*185, Gt. Portland St., London, W.1*

MANY endeavours have been made to design a compass which it would be possible to place behind the pilot in the rear part of the machine away from vibrational, electrical and magnetic disturbances. Such an installation implies, of course, the use of a remote reading instrument for the pilot. Many attempts have been made to evolve instruments of this type, but up to the present the enormous difficulties which arise have proved too severe. The Holmes Tele-Compass recently placed on the market by Smith's Aircraft Instruments has achieved this desired object with the characteristics of position, power and reliability. The compass itself has directional properties similar to the normal aperiodic compasses. Used with it is the Course Controller, an instrument with which, by means of a flexible shaft, the compass bowl can be orientated. A steering indicator is operated electrically from the Tele-Compass, which at all times shows the way to return the aircraft to the set course. The Tele-Compass has ample power to actuate an electro-magnetic relay without having to resort to amplifying means. The secondary circuit of the relay may be employed directly in series with a servo motor for controlling an automatic pilot.

Yet another instrument of great interest is the Wimpey Bomb Sight. This is a particularly accurate instrument, which although its primary purpose is a bomb sight, may yet be used to indicate the course to steer and the ground speed.

#### *L. A. Rumbold & Co.*

*Kilburn, N.W.6*

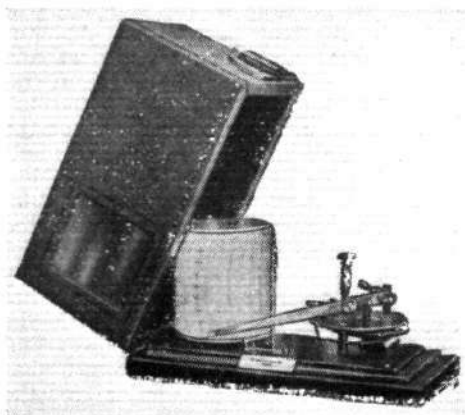
SUCCESSORS to Boyd, Carpenter & Co., this firm specialises in aircraft and automobile upholstery as well as electron metal work of all descriptions. Their electron tubular chairs have been supplied and fitted by Armstrong Whitworth, Imperial Airways, Saunders-Roe, Airspeed, General Aircraft, De Havilland and Blackburn, and a cabin completely trimmed by them will be seen by visitors to the Paris Show on the General Aircraft Company's "Monospar." Their chairs vary in weight, according to the type, from 3 lb. to 14 lb. completely upholstered, and these are made throughout from electron tubing. These can be supplied in adjustable or non-adjustable types and conform to the Air Ministry regulations, by which they have to pass a

test wherein the strain on the safety belt is 1,100 lb. For a long time corrosion was a serious matter when using electron but this has now been overcome and after a chromating bath the tubes are finished with enamel, which prevents any trouble from this source.

### Short & Mason, Ltd.

Walthamstow, London, E.17

SHORT & Mason are manufacturers of aeronautical and meteorological instruments, including altimeters, altigraphs, balloon meteorographs, micro-barographs, thermographs, anemometers and incidence gauges. One of the most recent productions is a port-



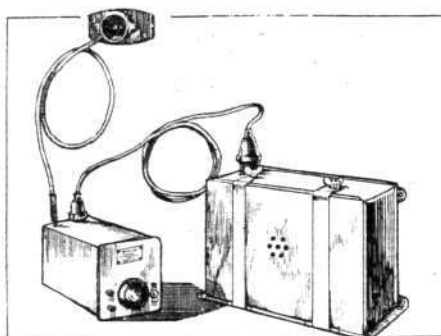
The S. & M. Portable Altigraph.

able altigraph specially constructed for the use of Civil Aviation and Aero Clubs where details of flights are desirable, such as during test flights or pilots' examination flights. Not only does this instrument record the altitude but also the time and duration. This is capable of recording movements of from 0 to 8,000 ft. in 200-ft. divisions on the chart, which incidentally can be supplied in metric equipments if desired. The movement is housed in a light and compact containing case with corner adjustments at top and bottom for suspension purposes. Its weight is only 2 lb.

### The Standard Telephone & Cable Co., Ltd.

Connaught House, Aldwych, W.C.2

THE range of aircraft radio equipment being exhibited at Paris by Standard Telephone & Cables will be very comprehensive. A small receiver specially designed for light aircraft which is operated from a fixed aerial is the A.R.1. Its wave length is variable between 600 and 1,000 metres and good reception of telephony can be had up to 100 miles from a ground station with a power of 300 watts. It is designed to operate from a small accumulator and dry batteries and with these its weight is under 20 lb. For larger aircraft there is the A.R.2 transmission, and reception is arranged for on telephony, C.W. and I.C.W.,



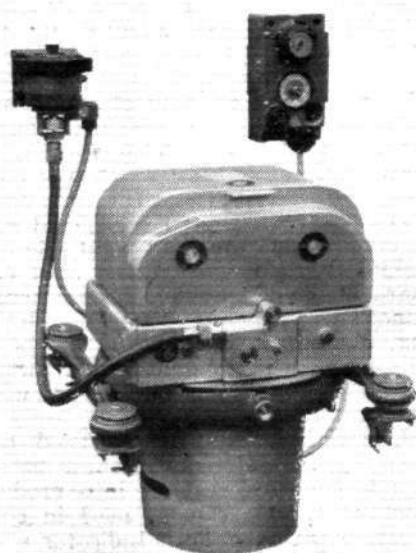
A) Standard Light Aircraft Receiver.

on both long and short waves. A wind-driven generator provides the operating current and the weight is in the region of 90 lb. The A.R.3 is a short-wave set operated from the pilot's seat by remote controls, particularly designed for use in fighting aircraft. For somewhat larger military aircraft, the A.R.4 provides for telephony and C.W. or I.C.W. telegraphy. An aerodrome transmitter type M.1 will also be shown, a feature of this set being the switch which brings it into operation immediately the hand telephone is lifted. Broadcasting to aircraft is therefore very similar to making an ordinary telephone call. The range for this set is about 100 miles with telephony and 150 miles on telegraphy.

### Williamson Manufacturing Co., Ltd.

Bush House, London, W.C.2

MR. C. M. WILLIAMSON, who took such a large part in supplying cameras during the war, and who was a pioneer in the development of automatic electric cameras, has now produced the latest range of Eagle cameras known as the "Eagle IV." This incorporates the well-known Williamson Louvre shutter which can be operated mechanically or by hand and is especially designed for use on the Continent, taking therefore photographs of 18 by 24 cm. The mechanism has accommodation of sufficient volume for 200 exposures, thus greatly



The Eagle IV Camera.

reducing the number of magazines which have to be carried in order to cover any particular area when carrying out an aerial survey. The camera itself is 10 lb. lighter than the Eagle I while taking approximately the same-size photographs. It is being shown at Paris in a Fairey "Fox," a machine peculiarly suitable for this combination.

The Williamson Manufacturing Co. will be pleased to give any of our readers, who wish them, full technical details of their cameras, as the space available in this supplement does not allow of our giving anything more than these very short particulars.

## METAL SUPPLIERS

### Accles & Pollock, Ltd.

Oldbury, Birmingham

STAINLESS steel is rapidly becoming one of the most usual materials to use in the construction of aircraft. Hitherto one has usually looked upon the use of stainless steel as confined to small fittings for seaplanes and the plating for seaplane floats or the hulls of flying boats. Accles & Pollock, however, have made a speciality of producing stainless steel tubes, despite the technical difficulties involved in the piercing and rolling of stainless steel billets, owing to the very narrow range of temperature and the strength of stainless steels at high temperatures at which these operations can be performed without introducing forging faults. The term "stainless steel" is somewhat wide, embracing as it does both the Austenitic steels with a high nickel content and the Martensitic steels with a very low nickel content. The former is of particular use for exhaust systems, particularly since the weld decay-proof type has been introduced. Its tensile limit of proportionality is so low in the fully softened condition as to render it of little value for other uses. The Martensitic steels are more generally used for the manufacture of tubes, but they have to be highly polished, otherwise the surface is apt to rust. They can be oxy-acetylene welded, but not so readily as the Austenitic types, and because of the air hardening in the region of the weld it is essential to heat-treat after welding.

### The British Aluminium Co., Ltd.

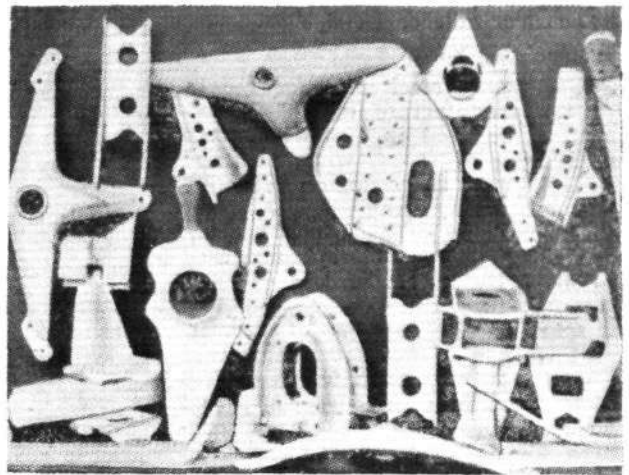
King William St., London, E.C.4

AIRCRAFT engineers make very extensive use of aluminium and aluminium alloys. The latter particularly are increasingly being used, as aircraft engineering calls for materials having a high strength weight ratio. Pure aluminium is used for such things as cowlings and fairings which are hammered, spun, or stamped out of the sheet. The hardening propensity which aluminium has under cold work such as hammering, plays a large part in strengthening and stiffening these





A part of the A. &amp; P. tube mills.



Some Welded Fittings in Firth's "Staybrite".

articles. Side panels, undershields, petrol and oil tanks are a few of the many other parts which all require aluminium for their manufacture and from these it can be seen that commercially pure aluminium is required in no small degree by all aircraft manufacturers. Such material is obtainable from the British Aluminium Co., who not only have rolling mills in England, but works in Scotland, Ireland and Norway.

#### *British Maxium, Ltd.*

*Wandsworth, London, S.W.18*

**L**IGHT alloys for use in aircraft are receiving more and more consideration, and of recent years British aircraft have undoubtedly led the way in the economical and genuinely practical use of these materials. Latterly it has been realised that still further weight can be saved by the use of alloys of magnesium, as these have a specific gravity considerably lower than the alloys of aluminium. Magnesium alloys are now used in all forms for castings, forgings, stampings, extrusions, rolled sheet, etc., and the output of this company has therefore grown very largely during the last few years. While these alloys are very light, their high physical properties are retained. The ultimate tensile strength of "worked" materials, being 16 to 20 tons per sq. in., and that for "cast" materials being 12 to 15 tons per sq. in. for an elongation of 15 per cent. Aircraft and engine designers are utilising these alloys in many positions where weight is an undesirable feature.

#### *James Booth & Co., Ltd.*

*Argyll St., Nchells, Birmingham*

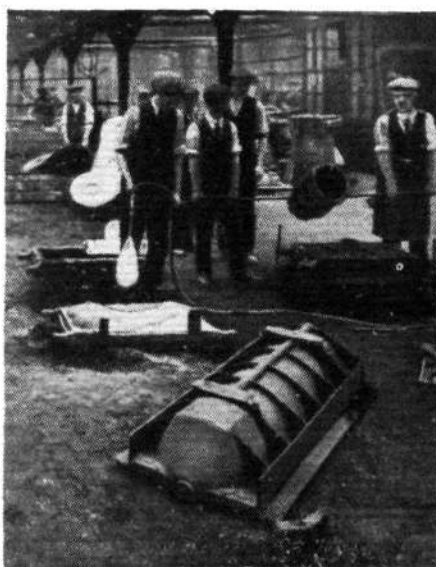
**E**STABLISHED of old, this firm manufactures wrought alloys and has been concerned with the production of duralumin ever since its invention, over 20 years ago. In duralumin they supply not only the heavier forgings and drop forgings but also strip down to 2/1000ths. in. thickness and tubes with a bore as small as 1/8 in. Sheet is produced in all sizes and strip up to 20 in. wide, while duralumin tubes

of any diameter up to about 5 1/2 in. are quite standard. Any size bars, up to 8 in. in diameter, can also be supplied either forged or extruded. Besides the ordinary standard duralumin, this firm manufactures every grade, like duralumin "H," which has the capacity for not age hardening at room temperatures but which can be hardened by exposure to a temperature of 150 deg. C. This is of particular use to aircraft designers because it allows of much work being done on the material after being quenched and the low temperature for hardening ensures correct heat treatment without distortion. Elektron is another production of the firm and this can be supplied in sheets, tubes, sections, pressings, etc. Although only having the specific gravity of 2/3 that of aluminium, it can be produced having a maximum tensile strength of some 20 tons per sq. in.

#### *R. W. Coan, Ltd.*

*Duncan Street, London, N.1*

**"COANAILIUM"** is an aluminium alloy specially manufactured by this firm to Air Ministry Specification D.T.D.25. It is non-corrosive to sea water, withstands damp atmospheres, and is particularly useful where strong light castings are required. It can be



A Corner of the Coan Foundry.

used for either sand or die-castings and is therefore particularly suitable for sea-going aircraft. Aluminium castings of every kind for the aircraft trade are turned out in the London works and during the war over 20,000 Scarf Gun-Rings were delivered. Both die-castings and sand castings of every conceivable form are produced in enormous quantities not only for the aircraft trade but also for chemical industries and those who deal with food containers, etc.

Recent mechanical tests on "Coanailium" have shown that die-cast test bars give a maximum stress in tons, of between 12.3 and 13.6, and for sand cast test bars of between 11.4 and 14.1. These figures show that "Coanailium" is certainly much stronger than ordinary aluminium alloys.

#### *Thomas Firth & John Brown, Ltd.*

*Norfolk Works, Sheffield*

**T**HERE is no end to the number of alloy steels which can profitably be used in the construction of aircraft. High-tensile steel is rapidly becoming of great importance. Refinement in detail design of aircraft necessitates careful design of fittings, and the finest materials in order to decrease the structural weight of aircraft, thus increasing their performance for a given horse-power. Apart, however, from materials of this nature, there is the family of rust and corrosion-resisting steels, whose use is rapidly becoming standardised for both sea-planes and flying boats. The latter in particular have recently been produced with hulls entirely composed of rustless steel plates and have so far given every satisfaction. Firth's have for a very long time made the provision of rustless steels their own especial care, so much so that no one who has any problem in guarding against corrosion need have any fear that this company will be unable to meet their needs.

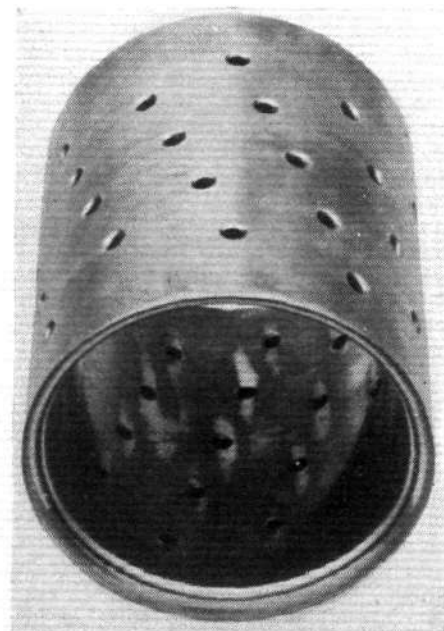
Firth's "Staybrite" is one of the best known stainless steels, and one moreover which may be welded and made into all manner of aircraft fittings. As our illustration shows, this material is eminently suitable for the manufacture of all kinds of built-up parts like those used in the control systems, etc.

**J. J. Habershon & Sons, Ltd.**  
Rotherham, Yorks

**H**IGH tensile steel strip for use in the manufacture of drawn sections, to be used in aircraft for the construction of spars, wing ribs and bracing struts is gradually becoming more general. Many of the major aircraft firms now have draw benches upon which they produce standardised sections. By means of various combinations, they can produce economical spars to suit any size of aircraft. For this type of work it is obviously of vital necessity to have steel strip which is entirely homogeneous, and also heat-treated to the correct condition for drawing. Cold-rolled steel strip in varying widths is supplied by Habershon, and every size and specification utilised in aircraft is now produced by them.

**The Hoyt Metal Co. of Gt. Britain, Ltd.**  
Putney, London, S.W.15

**A** PRODUCTION of this firm which is of very great interest to aero engine manufacturers is Hoyt No. 11 Anti-friction metal. This has been used in aero engines since the earliest days, and even as far back as 1911 the Green engine, which made in 1914 won the first prize in the Military Aeroplane Competition, had its bearings lined with Hoyt metal. In aeroplane engines very special care has to be taken with all the bearings, as obviously a breakdown in an aircraft engine has far greater consequences than in any engine used on land transport. The company has, of course, very wide experience of relining bearings of all types, and those who are not certain of any point should not hesitate to write to them for pouring temperatures, etc. No. 11 metal has been used by all the best-known aero engine manufacturers, and has contributed to the success of numberless record flights during recent years. This alloy is fully approved by the Air Ministry for engines of all powers.



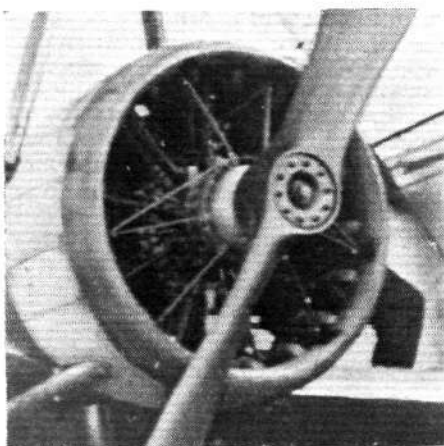
"Jupiter" big end bearing lined with Hoyt No. 11 anti-friction metal.

**POWER PLANT COMPONENTS**

**Boulton & Paul, Ltd.**

139, Queen Victoria Street, London, E.C.4

**T**OWNEND rings are essentially rings of approximately aerofoil section surrounding the cylinders of a radial engine whereby the head resistance of that unit is greatly decreased with a consequent increase in the performance of the aircraft. That these rings are of very great advantage is proved not only by the number of



A Townend Ring on the "Jupiter" engine of a "Sidstrand."

successes achieved by machines using them but also by the fact that many of the well-known aircraft and engine firms in this country and throughout the world have taken out licences from Boulton & Paul for their manufacture. Many factors are involved in the design of an effective Townend ring and extensive tests by this company have established that amongst these are the actual section of the ring, the ratio of ring chord length to diameter, the angular setting of the chord line, and the fore and aft position of the ring relative to the engine. It is quite possible to design a ring which on one particular aeroplane gives a very satisfactory result but which will give little or even adverse results on a very slightly different aircraft. This has undoubtedly sometimes given rise to the impression that the device is so sensitive to small changes in conditions as to be of limited value. This, however, is not the case, provided the ring is properly designed. Boulton & Paul hold at the disposal of all their licensees adequate design data from which it is possible to design a satisfactory ring for any combination of circumstances.

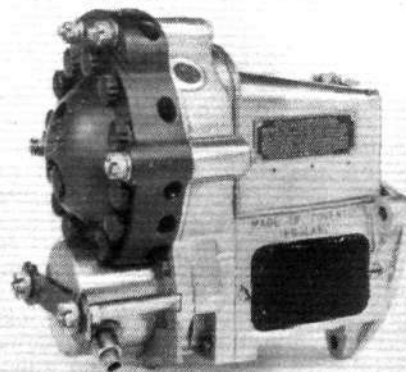
**British Piston Ring Co., Ltd.**  
Holbrook Lane, Coventry

**"BRICO"** aircraft piston rings are manufactured from special centrifugal castings which are produced

in the company's own foundries. The processes of inspection which are carried out on these rings during manufacture are extraordinarily carefully undertaken so that every ring conforms, of absolute necessity, to the high standard required for aero engine components. Piston rings made by this company are used by all the chief aero engine manufacturers in England and on the Continent. The firm also makes gudgeon pins and cylinder liners and many other parts for internal combustion engines. A publication of theirs which is well compiled and should be of great interest to users is "Piston Ring, Cast Iron, and Design," and those who are interested in the technicalities of the subject should write to the firm for a copy of this.

**British Thomson-Houston Co., Ltd.**  
Rugby

**A**IRCRAFT magnetos are one of the specialities of this company and their reliability is amply demonstrated by the many record flights which they have assisted to a successful conclusion, while they also played their part in securing for Great Britain the Schneider Trophy. Magnetos of both the rotating armature and polar inductor types are made. Particular attention has been paid in their construction in order to eliminate troubles of any kind. All the rotating armature types are, for example, so constructed that no attention is required in service other than an occasional wipe-over of the high-tension insulated parts and examination to the contact breaker. The bearings are packed with high-melting-point grease and the magnetos will run without any further lubrication for at least 400 hours. Those of the Polar Inductor type are of a more substantial and heavier construction and are arranged for screening fully against wireless interference. There are two main forms of these magnetos. The A.V. and S.V. type utilise a large horseshoe magnet of tungsten steel with the coil housed underneath the arch. The A and S.C. types have cobalt steel magnets on the side of the housings in place of the horseshoe tungsten magnets. It is not advisable to use the rotating armature type at speeds above 4,500 r.p.m., and where weight is not the most important feature polar inductor magnetos should be used.

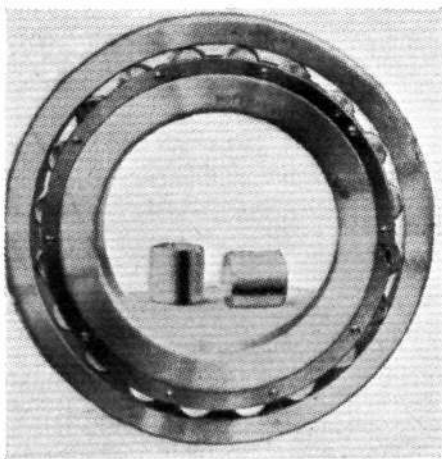


A B.T.H. S.C. 12/702 Magneto.



**The Hoffmann Manufacturing Co., Ltd.**  
Chelmsford

**H**OFFMANN ball and roller bearings are being very widely used indeed in aircraft and aircraft engines. For the latter purpose they have been used for a very long time, but nowadays, the refinements of detail design becoming so apparent in our aircraft call for the use of roller or ball bearings in many parts of the aircraft structure itself. The Hoffmann roller journal bearing is a typical bearing which has a wide use. The rollers are of the short parallel type, thus affording full line contact to both races and permitting maximum loads to be carried safely. Moreover, these rollers being closely guided are precluded from any tendency to skew, so that a true rolling motion is attained resulting in an extremely low friction loss. A newer type, the Duplex ball bearing has been designed to take both journal and thrust loads. It has only a single row of balls, but with an alternative pair of tracks, one pair functioning under thrust from one, and the other when from the opposite, direction. The outer race is split circumferentially, allowing the use of a maximum number of balls. The Hoffmann Company are prepared to supply bearings for almost every purpose and users are invited to apply for any information they may require.



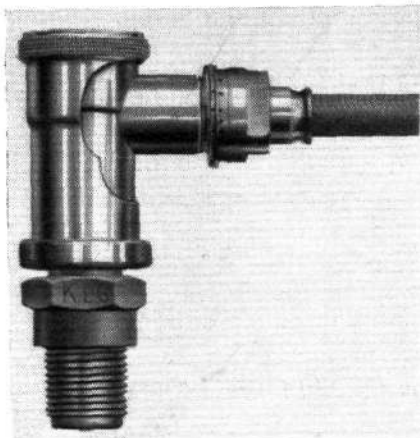
A standard Hoffmann roller bearing.

**K.L.G. Sparking Plugs, Ltd.**  
Putney Vale, London, S.W.15

**O**NE of the most important and interesting developments in connection with K.L.G. Sparking Plugs is their screen for insulating the plugs in aircraft wherein wireless is fitted. The original patent for screening sparking plugs was granted to the K.L.G. Company over twelve years ago and ever since that time careful attention has been given to that subject. The screen consists of an elbow moulded in an insulating material, of which one arm receives the high-tension wire from the magneto while the other surrounds the external sleeve of the plug. The arm taking the high-tension wire is enclosed in an aluminium die casting, interlocking with a piece of tubular duralumin surrounding the outer arm. This die casting has a gland nut at its outer end engaging on the securing flange of the metallic braiding on the high-tension wire and thus bringing

this braiding into firm electrical contact with the body of the screen. At the lower end the duralumin tube sits on the upper surface of the gland nut of the sparking plug and both at this point and at the upper connection waterproof joints are formed preventing the entry of moisture.

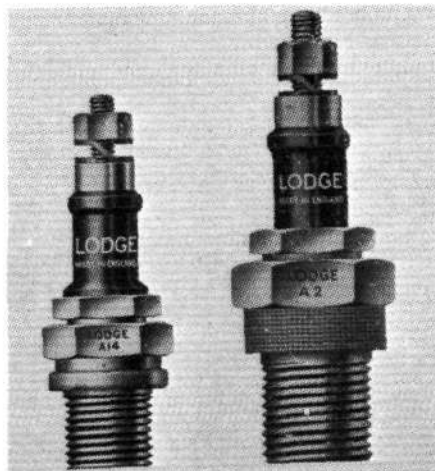
While this screen is proof against vibration and can only be detached by a definite downward pressure and rotation, it is yet instantly detachable and forms a particularly reliable type of quick-release high tension terminal.



The K.L.G. plug screen.

**Lodge Plugs, Ltd.**  
Rugby

**N**UMEROUS successes have been achieved by aircraft whose engines have utilised Lodge Plugs. The excellence of these plugs is known all over the world and their list of models contains one which is suitable for every type of aircraft engine whatever its nationality. The tests imposed not only by the company's own Inspection Department but also by that of the A.I.D., ensure that these plugs are of the highest quality obtainable and that in ordinary circumstances, with reasonable care, plug trouble should be a thing of the past. The most widely used types have a thread diameter of 18 mm., but of recent years a few engines have started to use a plug having a thread diameter of only 12 mm. The newest of the large range is now being produced with a thread diameter of 14 mm.



The 14-mm. and 18-mm. thread Lodge Plugs.

**The Norman Engineering Co., Ltd.**  
Leamington Spa, Warwickshire

**B**EING an "approved" firm, this company is on the A.M. list and the range of products from their factory is very wide indeed. It includes almost every part of aircraft engines, as, for example, cylinder heads, cylinder barrels, locking rings, exhaust and inlet part flanges, valve rockers and stems, petrol pump drive casings, valve spring retainers, sockets, shackle bolts, etc. They also have extensive facilities for enabling them to undertake every kind of special experimental work connected with such parts whether for aircraft engines or for the machined fittings of the actual aircraft.

**Serck Radiators, Ltd.**  
Warwick Road, Birmingham

**D**ESPITE the large number of air-cooled engines used in aircraft, there are still a very large number of water-cooled engines in service not only for high-speed military aircraft but also for high-performance aircraft of all types. Not the least important part of these engines is the radiator, and this company is probably the largest manufacturer of aircraft radiators in the country. Most of their radiators use the Anderton Brown tube, which enables the radiators to give great depth with small frontal area. The company owns their own tube mills and are entirely self-contained, being able to manufacture all the materials necessary for an aircraft radiator. The extreme pressures which the aircraft radiator is called upon to withstand in flight have often given trouble, but the patented corrugated side strip introduced by this company has solved this problem. Radiators built with this corrugated side strip have actually been subjected to a test pressure of 23 lb. per sq. in.; the resulting distortion being only  $\frac{1}{8}$  in. each side. With the methods adopted previous to the introduction of this strip such a test would have been impossible.

**Tecalemit, Ltd.**  
Brentford, Middlesex

**A**DEQUATE oil filtering is a vital necessity in aircraft engines, and the filter recently introduced by Tecalemit Ltd. is of particular interest not only due to its accessibility but also due to the fact that it combines the functions of cleaning the oil with that of cooling it. The filter element used is a star-shaped one, thus providing an extremely large surface area for its overall size. The special felt of which it is constructed is sewn on to a galvanised wire former and is of a material which will retain particles of dirt or other solid matter, of less than 0.04 mm. Under these conditions not only all non-soluble foreign matter is eliminated from the oil during its passage through the filter but also a large portion of the colloidal carbon is retained. This star-shaped filter element is quite easy to remove, and after being rinsed in petrol is ready for further use. The design of these filters is elastic and can be arranged to suit any particular type of engine installation. In compression-ignition engines

particularly, adequate filtering arrangements for the oil are of the utmost importance owing to the fact that with high compression and incomplete combustion, half-burnt fuel often reaches the crankcase, thereby rapidly carbonising the oil.

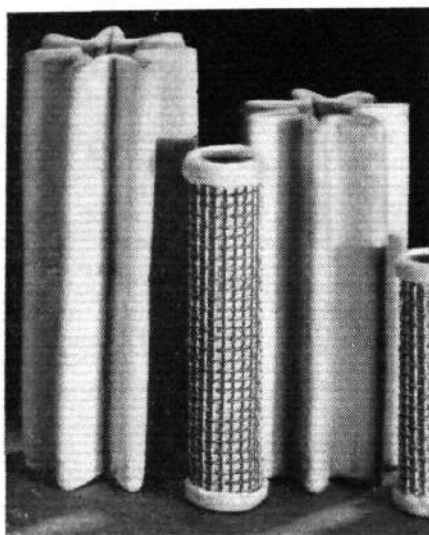
**Wellworthy, Ltd.**  
*Lymington, Hants*

**P**ISTON rings although small items, are some of the most important parts in any internal combustion engine, particularly so in an aircraft engine, as performance and perfect running are required at all times. Wellworthy is a firm which specialises in the production of these vital necessities. Made with meticulous care from material conforming to Air Ministry Specification 4.K6 they have been used by a very large number of aircraft engine firms such as Napier & Son, Cirrus-Hermes, De Havilland Aircraft Co., Ltd., etc. Careful analysis of the reasons why piston rings, even when made of the correct material and of suitable design, break, has been made and these breakages are generally found to be due to (a) insufficient expansion allowance, or (b) slight seizure due to partial lack of lubrication, or (c) oversteering in the assembly. Each of these points has received very careful consideration by the engineers of this firm with the result that they may claim to have done everything possible to eliminate these causes.

## TYRES, WHEELS AND BRAKES

**Dunlop Rubber Co., Ltd.**  
*Fort Dunlop, Birmingham*

**D**UNLOP wheels, brakes and aeroplane tyres are among the most interesting productions of this firm. Their brake is of particular importance, as it is extremely light, requires no adjustment and is hand-operated by the pilot, while at the same time allowing automatic differential control of each wheel by movement of the rudder bar. Furthermore, although of the



Tecalemit oil filter elements.

pneumatic type, it is absolutely leak-proof and if so desired may be used for parking the aircraft. It consists of an annular expansion chamber which when inflated, presses segmental brake blocks equally outwards against the brake drum of the wheel. The air for operating the brakes is contained in a compressed air cylinder and is controlled by a dual relay valve operated by the rudder bar.

**Palmer Tyre Co., Ltd.**  
*Aldwych House, London, W.C.2*

**O**NE of the oldest manufacturers of tyres, designed especially for use on aircraft of all sizes and types, is the Palmer Tyre Co. Their latest addition to the range of, what might well be called necessities for aircraft, is that of a landing wheel brake. This has the merit of great simplicity, while at the same time being exceptionally light in its essentials. It consists of an expansion chamber to which is attached a complete ring of brake blocks. This expansion chamber is operated by air from a cylinder and the supply of air is controlled by a very simple foot mechanism. This form of brake has nearly 100 per cent. contact between the brake blocks and the drum, and therefore allows the use of a much lighter drum than is normally employed without the fear of distortion occurring. It is one of the few

designs of wheel brake specifically designed for aircraft use and therefore avoids inherent constructional faults of braking systems which have been adapted from motor-car practice.

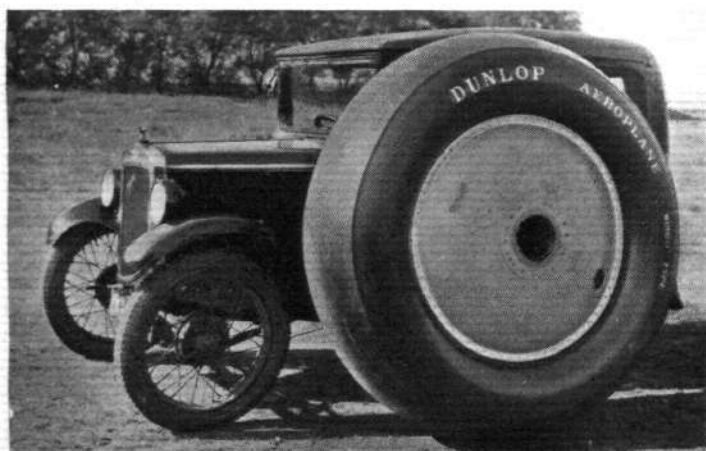
## WOOD SUPPLIERS

**The Aeronautical & Panel Plywood Co., Ltd.**  
*218, Kingsland Road, London, E.2*

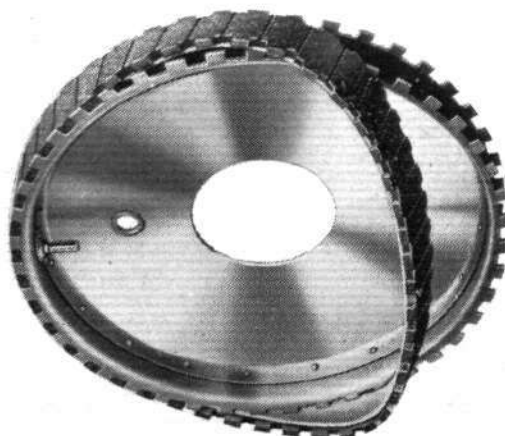
**A**MONG the earliest pioneers of the plywood manufacturing industry in this country, this company are suppliers not only to all the leading British aircraft constructors but also to those in most other countries of the world. Their product is sold under the trade name of "Mallite" and is manufactured in all thicknesses from 0.8 mm. upwards. Canadian birch, specially selected for straightness in grain, freedom from knots or blemishes of any description, is the timber used. The plies are cemented together with a waterproof adhesive compound to the company's own specification and every sheet, which conforms to the British standard specification 3.V3, is tested and stamped by an approved inspector before despatch. "Mallite" plywood is manufactured faced with various fancy wood veneers such as oak, mahogany, walnut, etc., while shaped plywood can be produced, if required, to almost any camber.

**Flexo Plywood Industries, Ltd.**  
*South Chingford, London, E.4.*

**H**ERE is another firm which specialises in the production of aeronautical plywood. Such material is, of course, made to the British standard specification 3.V3 and is widely used by many aircraft manufacturers. For example, over 60,000 ft. super of Flexo plywood have recently been supplied to Sir W. G. Armstrong Whitworth Aircraft Ltd. to be used in the eight "Atlanta" class monoplanes which have been built for Imperial Airways to use on the South African air route. This plywood is used, not only for wing coverings, for the ribs and fuselage, but also extensively as interior paneling.



A Dunlop tyre to carry 15,000 lb.



Parts of the Palmer wheel brake.



# MRS. MOLLISON'S FINE FLIGHT

Beats her Husband's Cape Record by 10½ Hours

THESE are few, we think, who will not admit that Mrs. J. A. Mollison (Miss Amy Johnson) has accomplished a really remarkable feat in her latest flight—from England to Cape Town in 4 days 6 hr. 54 min., thus beating her husband's previous record for the same journey of 4 days 17 hr. 22 min. by 10 hr. 28 min.

Not only is the flight a magnificent achievement as far as the time taken is concerned, but as a feat of endurance, pluck, good piloting and navigation, it must be placed foremost in the list of great flights.

Throughout the flight Mrs. Mollison had had only 5 hours' sleep!

As reported in last week's issue of FLIGHT, Mrs. Mollison set out from Lympe, in her D.H. "Puss Moth" ("Gipsy Major"), *Desert Cloud*, at 6.37 a.m. on November 14, and at 7.30 p.m. arrived at Oran, on the North African coast, 1,100 miles distant. She made an hour's stop to refuel en route at Barcelona, and after a halt of 4 hours at Oran she started off on a night flight across the Sahara Desert towards Gao and Niamey.

At this stage some anxiety was felt owing to the absence of news concerning her progress for over 24 hours. Then came the news that she had landed safely at Gao (some 1,300 miles from Oran) at noon, November 15—having thus successfully accomplished a most difficult flight across the desert, without landmarks, at night. After a short stop for refuelling Mrs. Mollison left for Duala, but after flying for about an hour she noticed that her tanks were almost empty. She at once returned to Gao and found that they had put in only 10 galls. instead of 42 galls.!

After this irritating delay she proceeded once more, arriving safely at Duala in the evening, and continuing, after a short halt, towards Loanda. On this stage, during the night, the oil circulation caused her some trouble, and so she landed next morning at Benguela (Port. W. Africa) to set matters aright.

Fortunately, the trouble was not serious—probably a portion of the Sahara in the filters—and she was able to

proceed after a delay of some 9 hours. A halt to refuel was made at Mossamedes in the evening of November 17, and then came another night flight on the final stage of her journey.

Meanwhile, news of her start on the last hop reached Capetown, and from midnight, November 17-18, huge crowds made their way to the Municipal aerodrome—although Mrs. Mollison could not possibly arrive much before midday. There were, therefore, several thousand people on the aerodrome by the time she arrived.

Mrs. Mollison appeared somewhat unexpectedly, from inland, shortly after 3 p.m., and it was not until the machine was about to land that the crowd realised that it was the *Desert Cloud*. She landed at 3.31 p.m. (1.31 p.m. G.M.T.), and immediately the cheering crowd broke down the barriers and surrounded the machine. It was some time before she could get out of her machine, but eventually she was got into a car, and before driving away she waved to the crowd and said: "Thank you very much for your great welcome. I said I would come back, and I have done so. It is really too kind of you to give me such a welcome."

Safely inside the aerodrome building, Mrs. Mollison spoke over the telephone to Mr. Mollison, after which she was taken to some friends, where she could obtain some well-earned sleep.

The following is a log of her flight, together with that of Mr. Mollison's, for comparison. Approximate mileage in brackets:—

	Mrs. Mollison	Mr. Mollison
1st day ..	Lympne-Oran (1,100)	Lympne-Colomb Bechar (1,450)
2nd ..	Oran-Gao (1,400)	Colomb Bechar-Reggan (375)
3rd ..	Gao-Duala (1,150)	Reggan-Niamey (935)
4th ..	Duala-Mossamedes (1,350)	Niamey-Loanda (1,850)
5th ..	Mossamedes-Cape (1,300)	Loanda-Cape (1,745)

(Concluded on page 1141)



WELL EQUIPPED : Mrs. J. A. Mollison (Amy Johnson) ready to leave for the Cape.

# From the Clubs

## BROOKLANDS

The School has been quite busy during the past week, but once again the weather has been unfavourable. Two days have been complete wash-outs, owing to dense fog, and there has been an unpleasant mist on several other days during the week.

The School has gained another new pupil, Mr. Eves, who has commenced instruction and is making satisfactory progress, while a number of regular enthusiasts are in constant attendance at the aerodrome. Mr. Midgley is taking a course of training for his "B" licence, Mr. Trelawney is having ground instruction with the same end in view, and Messrs. Bond, Smith and Marshall are busy with their "A's." Mr. Masterman-Wood has now gone solo, as has Mr. Howitt, a member of the College of Aeronautical Engineering Aero Club. Mr. Barr has been doing further flying for the Sales Department, including a trip to Sywell.

One Sunday a formation from the School flew over to lunch at Hanworth, in return for a visit which Hanworth members had paid to Brooklands the week before. Everyone enjoyed the visit, and these flying lunch parties—as they have been christened—are sure to be a popular innovation among all private owners.

Mr. G. E. Lowdell, chief instructor, and Miss W. Beer were married at Byfleet on Monday, November 21, and after the ceremony a party was held at Brooklands. Miss Beer is well known to all habitués of the aerodrome, for she is a familiar figure in "The Shop"; Mr. Lowdell has taken charge of many of the pupils here, and is well known in the flying world.

*Press Aero Club.*—The work of the Press Aero Club—the club which has been founded for and is confined to newspaper men—has been severely handicapped; most of its members are only free at week-ends, when the weather has been far from inviting. Mr. Iams is still a regular visitor at the aerodrome, and a fine Sunday, of course, produces a good attendance of members.

*The College of Aeronautical Engineering.*—Work on the College's new premises at Brooklands is now well under way. The building has been designed by Mr. Graham Dawbarn, the architect of the Brooklands Aero Club, and will be fully equipped to meet all the needs of the students. The first batch of pupils will arrive on January 4, 1933, and from this date the premises will be in regular use. After a year's technical and theoretical training at Chelsea, students of the College will during their second year be brought into contact with actual aerodrome work at Brooklands, and will be able to take up a post anywhere. The demand for completely trained young men will, of course, increase as the aviation industry increases, and realising this fact many parents have inquired with regard to boys still at school. Their foresight is commendable, and will also ensure a regular supply of trained men for the industry. The College Aero Club, which is organised and run by the students themselves, and looks after the flying side of their training—has been progressing very well. In spite of the fact that it is now too dark to fly after College hours (the club's work is confined to week-ends during the winter months) there are ten soloists; as mentioned previously, there was another first solo on Friday.

Capt. Davis has been testing the "Klemm," Col. Strange has been away in the "Spartan," and visitors include Messrs. Stace, in a "Spartan," and Powis, in a "Puss Moth" with Yugo-Slavian markings. Mr. Raymond Quilter has been making further tests with the new G.Q. parachute. New members of the Brooklands Aero Club include Messrs. Blackwell and Flt. Lt. Cozens. The club "Moth" has been in demand lately for cross-country work.

## GATWICK GOSSIP

THE two minutes' silence on Armistice Day was respectfully kept at Gatwick by the staff of the Redwing Aircraft Co., Ltd., and the Surrey Aero Club was assembled outside the club-house facing the Civil Air Ensign. At 11 o'clock a red very light was fired and the ensign lowered. At two minutes past eleven a green very light was fired and the ensign raised to half-mast.

The Redwing Aircraft Co. and members of the Surrey Aero Club wish to express their deepest sympathy to Mr. J. W. Anderson upon the death of his father, Mr. P. J. Anderson. The late Mr. Anderson, although in no way connected with aviation, had been extremely interested in the Redwing through his other duties to Mr. F. O. Bezner, and also through his son, who has been with the Redwing organisation since its inception in 1929.

Mr. Gurth Dulling left on Thursday last on his way to Rangoon. In appropriate style he booked to Paris by Imperial Airways, Ltd., and thence by the French line to Marseilles, where he connected with his steamship to complete the journey. All his friends will miss his cheery smile at Gatwick, and, as a mark of appreciation, the Redwing Aircraft Co. gave him a cocktail party on Wednesday evening, when the joint directors (Mr. J. Kenworthy and Mr. H. R. Trost) presented him with a scale model of the Redwing. Following this Mr. Dulling was entertained to dinner in the club-house by his friends in the Surrey Aero Club.

The ground engineering courses at Gatwick are proving very popular, and two more pupils have taken up instruction during the past week. Several of the flying pupils taking the "two years' course" are now awaiting favourable opportunities to do their "night flight" in order to complete their "B" licence.

## NATIONAL FLYING SERVICES, HANWORTH

Owing to poor visibility and general bad weather flying has been somewhat restricted; however, a few cross-country flights have been carried out and Mr. G. Everett successfully completed his "A" licence tests. On Sunday last five machines from Brooklands returned the luncheon visit which members made to Brooklands the Sunday before.

## MAIDSTONE AERO CLUB

Those desiring to join the club should note that by joining now the annual subscription of 3 gns. will include the remainder of 1932, and the entrance fee, which will be imposed on January 1, will also be avoided. The club has one lock-up hangar, suitable for a "Puss Moth," to let at a fee of £2 10s. a month. Mr. J. Barton, of "Broadwater," Kent, has resigned his secretaryship and Mr. William Colyer-Fergusson, son of Sir Thomas Colyer-Fergusson, Bart., of Igham Mote, Sevenoaks, Kent, has been appointed in his stead. The new secretary will be welcomed on Sunday, December 4, at the club's monthly "At Home." On December 10 the annual dance will be held in the clubhouse.

During the Christmas holidays special arrangements have been made for the club to be kept open and all members and their friends will be especially welcome, while on Bank Holiday, December 27, there will be a "Children's Christmas Tree Party" from 3.30 p.m.

Land, Air and Water Services, Ltd., have now completed the organisation of their service department and cars belonging to members will be attended to at competitive prices; cars can also be hired and garaged.



The Club House of the Maidstone Aero Club at West Malling Aerodrome.



## KENT FLYING CLUB

In spite of the foggy weather the club has been maintaining a very fair average of flying hours during the past week. Mr. Ramsay has carried out a considerable amount of solo flying on his Autogiro. The club are holding their annual dance at the County Hall, Canterbury, on Friday, December 9, from 9 p.m. to 1 a.m.; tickets, 3s. single and 5s. 6d. double, may be obtained from the secretary or at the door; there will be ample accommodation in the club hangar for any machines.

## YORKSHIRE AEROPLANE CLUB (N.F.S.)

In spite of variable weather, a good average of flying hours has been kept up, and Yeadon report the joining of several new flying members. On Saturday a famous pioneer of aerial transport—Santa Claus—arrived "by air" at Yeadon, thence continuing his journey to Lewis's large new store in Leeds, where he will be in good time for Christmas.

## LONDON AEROPLANE CLUB

At the beginning of the week when visibility was slightly improved, Miss Allen made her first solo flight, and on subsequent days she and other beginners took advantage of the light easterly winds which kept Stag Lane Aerodrome clear. An example of how accessible is Stag Lane was provided the other day when a city worker who had taken two hours off in the middle of the day found himself with an hour to spare; he betook himself with all speed to Stag Lane and enjoyed 15 min. flying, after which he returned to London in time for his appointment.

## A. A. HANDBOOK FOR AIRMEN

The Automobile Association have produced a new issue of their handbook on flying. It will be found useful to those desirous of learning to fly and to those who do fly, for it gives information about the various clubs throughout the country, such as the flying rates, the machines available, and a rough description of the locality of various aerodromes.

## READING AERO CLUB

The "Woodley weather" which used to be the pride and joy of the club has deserted it and mist has taken its place; in spite of this, however, two machines were kept moderately busy with instructional and solo flying. War-time memories are revived by the sight of a privately-owned Bristol Fighter which is now kept on the aerodrome and seems to shoot off the ground and climb like a young scout revelling in its reclassification as a "civilian." The new hangar is nearly completed and will be used for all

serviceable machines which will leave the old one for overhauls.

## FLYING CLUB SUBSIDIES

In answer to a question in the House of Commons on November 16, on the amount of subsidy earned to date by each of the approved flying clubs during the financial year, Sir Philip Sassoon gave the following figures:—Bristol and Wessex £625, Eastern Counties £110, Hampshire £415, Herts and Essex £468, Leicestershire £190, Lancashire £352, London £476, Liverpool and District £237, Midland £290, Newcastle-upon-Tyne £250, Norfolk and Norwich £150, Northamptonshire £70, Scottish £258, Southern £70.

He pointed out, however, that in most cases these figures did not represent the amount of subsidy actually earned to date, as fresh agreements giving effect to the revised subsidy scheme (which operated as from the commencement of the current financial year) were still in course of negotiation.

## HAMPSHIRE AEROPLANE CLUB

The club commenced operations on the new aerodrome at Atlantic Park, Eastleigh, on November 5. A building which was used during the war as an officers' mess has been fitted up as a club-house, and it is much bigger than the old club-house at Hamble. Later on it is hoped to be able to accommodate members who wish to live at the club while learning to fly. There is also plenty of room in the hangar, which is greatly appreciated by the ground engineers, as they can now house all the club aircraft in addition to several privately owned aircraft, without folding the wings.

Members are finding the advantage of having the club nearer to Southampton, as it is only seven minutes' walk from the Corporation tramway terminus at Swaythling.

The third landing competition of the year was held recently, and was won by Mr. E. A. Verdon-Roe, who obtained his "A" licence during the summer.

In spite of fog during the past fortnight, 39 hours' flying has been put in, and Messrs. Wateridge and Kerby have passed their "A" licence tests. On Monday last, however, the fog proved too much even for Col. Strange, who was on his way to Brooklands, and had to put down here and leave his machine for the night. Also, on Friday last, Mr. Keith Jopp, who was trying to get through to Scotland on Col. Smith Barry's "Puss Moth," was held up by the fog until to-day.

The seventh annual dinner and dance of the club is being held on December 2 at the South Western Hotel, Southampton. Tickets for dinner and dance are 12s. 6d., and for the dance only 5s. 6d.

## A Date to Keep!

"To meet Mrs. J. A. Mollison" a ball has been arranged by the British Gliding Association for January 11 at the Portman Rooms. Apart from the pleasure of personally offering their congratulations to the notable airwoman, the guests will be ensured an excellent time between 9 p.m. and 2 a.m. Two bands have been engaged, and a very moderate charge is being made for tickets, namely 10s. for a double ticket, which will include refreshments. Application for tickets should be made to 19, Berkeley Street (Tel.: Mayfair 4034).

## Birds' Wings

MR. C. H. LATIMER-NEEDHAM has an interesting little article in the *Sailplane* dealing with the wing oscillations of birds in flight. He illustrates the different tracks followed by various birds and shows how the path of a bird's wing through the air is a circular motion. Generally speaking the greater part of the sustaining and propelling force is gained in the down stroke during which the large pectoral, or depressor, muscle is in action, the wing being then raised by the minor pectoral, or elevator, muscle. The wing, at the bottom of its stroke, develops a large camber presenting an angle of incidence to the air flow which gives an additional lift at a time when the body is likely to sink. It appears that there are two distinct methods of flying employed by birds, in one the lift and forward speed are obtained on the down stroke with little or no work done on the return, in the other method the lift is obtained equally on both the up and down strokes.

A CORRESPONDENT of the *Sailplane* writes describing the interesting behaviour of a glider on meeting a rain-storm. As the glider approaches the influence of the storm it is met by a wedge of cold air which causes disturbances not unlike a small squall, but once this small area of disturbance has passed there is a short period of calm air free from upward or downward currents, due to the front slant of the cold air wedge acting as a protective covering to the air beneath, the glider will then come under the full influence of the mass of cold air through which rain is falling.

## R.Ae.S. Lecture

On Thursday, December 1, Mr. A. Fage, F.R.Ae.S., will read his paper on "The Behaviour of Fluids in Turbulent Motion" before the Society. Mr. Fage has been engaged on research work at the National Physical Laboratory for the past twenty years, and is a member of the Aerodynamics Sub-Committee and the Fluid Motion Panel of the Aeronautical Research Committee. Turbulence is of outstanding importance in the consideration of the motion of aircraft. Mr. Fage describes the work of himself, with the ultra microscope, on the flow very close to the surfaces of bodies and the work of other experimenters in this important field. He puts forward some suggestions from and results of turbulent flow experiments which have not been previously published. The lecture, which will be illustrated, will be delivered in the Royal Society of Arts, 18, John Street, Adelphi, W.C.2, at 6.30 p.m.

## Correspondence

*The Editor does not hold himself responsible for opinions expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters intended for insertion in these columns.*

**THE LANDING SPEED OF THE PERCIVAL "GULL"**  
[2813] Like your correspondent J. van Hattum, I find it very difficult to believe the figure of 42 m.p.h. given as the landing speed of the "Gull."

With a wing loading of 12.1 lb. per sq. ft., 42 m.p.h. means a maximum lift coefficient of 1.35, an extraordinarily high figure. As Mr. Van Hattum says, allowance for fuselage lift and ground effect will account for some of the discrepancy, but the actual air speed must be considerably higher than 42 m.p.h.

Similar remarks apply to the published landing speeds of quite a number of machines. Recently a case came under my observation in connection with a monoplane, constructed in Melbourne, of total weight 4,350 lb. and wing area 390 sq. ft. (wing loading 11.3 lb. per sq. ft.). Up in the air the machine was stalled, with the engine throttled back, and gave a minimum reading of 45 m.p.h. on the air speed indicator. This corresponds to a maximum lift coefficient of 1.08, and no allowance can be made for ground effect. A model of the wing tested in the wind tunnel here gave a maximum lift coefficient of 0.75. In order to check up the A.S.I., the Pitot static head was tried out in the wind tunnel, but it was found that the reading of the Pitot head-A.S.I. combination was very nearly correct at 45 m.p.h. when the Pitot static head was set at about the stalling angle. It is therefore evident that instrument errors are not responsible for the discrepancy and some other cause must be sought.

The explanation seems to me to be that circulation round the wing or wings is the prime cause of low readings of air speed near the stalling attitude. Circulation gives rise to so-called interference effects, or position errors, and it is well known that such effects, for a biplane, cause a low reading of air speed near stalling, and leading to an error, of some 7 or 8 per cent., where the Pitot-static head is placed in the normal position.

In the monoplane mentioned the Pitot-static head is mounted below the wing, and apparently is in a similar position for the "Gull." The circulation round the wing reduces the air velocity under the wing and increases it above, the reduction or increase being large near the wing surface and decreasing with distance from the wing. Figures published in R. & M. 989, and experiments made here, show that the reduction in air velocity under the wing may be very marked. In fact, near the stalling angle the error may easily be of the order of 20 per cent. for a normal position of the Pitot-static head.

It therefore seems to me that this fact is capable of explaining the discrepancy noted in the two machines mentioned, and the conclusion can be drawn that the reading of a normal air speed indicator is unreliable at high angles of incidence and low air speeds.

E. J. C. RENNIE,

Senior Lecturer in Aerodynamics,

University of Melbourne.

October 7, 1932.



## Book Reviews

*"International Air Guide, 2nd edition." Published with the approval of the International Aeronautical Federation. (Sampson, Low, Marston & Co., Ltd.) Obtainable from FLIGHT Office. Price 56s. 3d. post free.*

THE second edition of this work is now published in two volumes, and future editions will be the same. The first volume contains information about commercial aviation, air travel and details of official and private institutions; the second volume deals with ground organisation of aviation, and description of airports throughout the world.

Prince Bibesco, in an introductory article, states, to use his own words, "that he was stirred when he looked upon these pages wherein is recorded the advance of aviation during 20 years."

Lord Gorell reviews the development of private flying, emphasising the achievement of Sqd. Ldr. Bert Hinkler, who, in November, 1931, flew non-stop from New York to Jamaica, thence by stages to Natal, Brazil, and across the Southern Atlantic to St. Louis in West Africa.

Sir Alan J. Cobham gives some useful hints on flying through Africa, warning pilots to beware of hail storms, which produce hailstones as large as eggs, which will smash up any machine—but Sir Alan does not state whether he refers to ostrich eggs or ants' eggs. He also warns pilots that the white settlers (an unfortunate expression?) are a little fed up with aviators, who have exploited their hospitality in the past; Sir Alan's experiences of Colonial hospitality must have been unfortunate, for few pilots will agree that his accusation (if such it is meant to be) is just.

The work contains detailed information about Government organisation, flying clubs, various aeronautical publications and an individual description of the work done by commercial flying companies. There are excellent maps of the various Continental routes, and a map of the world shows the various aerial routes which traverse our globe; though had these routes been marked in various colours, denoting the nation responsible, the maps' utility would have been much increased. Curiously, no routes are marked on the Continent of Australia.

This second edition, however, is a vast improvement on the first, and, taking into consideration the varied and

comprehensive nature of its contents, the ease with which information on a subject can be found is remarkable.

*"Blind Flying in Theory and Practice." By Major W. C. Ocker and Lt. Carl J. Crane. Illustrated. (1st edition, Naylor Printing Co., 1932.)*

THIS is a work of 196 pages devoted to the actual problem of blind flight and its subsidiaries. It comprises a great number of illustrated descriptions of instruments, a good deal of slightly too rhetorical discussion of difficulties and a not too lucid exposition of the technique whereby these difficulties may be overcome.

Maj. Ocker has long been recognised in this country as one of the world's leaders in this subject. It is, therefore, disappointing that he still finds it necessary to spend so much space in convincing his readers of their inability to self-orientate without a spatial datum. He spends 38 pages in an admittedly thorough thesis on difficulties. In another 75 pages he describes instruments, without adequate differentiation between those which are primarily necessary to blind flying and those which are secondary. The typical dashboard layouts illustrated seem poor, but it is not easy to find a good layout in this country.

The relative merits of the "turn indicator method" as against the "artificial horizon method" are correctly stated (page 113), and up to page 128 there is a really useful outline of flight routine with analysis of the sensory effects derived from various control movements. The book seriously lacks any constructive remarks on the psychological difficulties of pupils and the attack thereon by instructors. In fact, it is not apparent that any actual method of instruction is suggested. There is a tendency to rely on a sort of "formula" technique which in the writer's experience utterly breaks down in the face of a pupil's practical difficulties.

The short examination of radio, Robot pilot, and decoding apparatus is of interest. The "Flight Integrator" is worth study. The "Ocker Chair" is brought into some prominence, but it is not clear how it is used, except as a means of convincing pupils of their physical inabilities. Ground training might well have received more notice.

W. E. J.



# Air Transport

## INTERNATIONAL AIR TRANSPORT

THE Civil Aviation Section of the London Chamber of Commerce has had under consideration the formalities and regulations which at the present time are hindering the development of International Air Transport.

Probably the chief difficulty which has to be faced by all aircraft, whether commercial or private, is the necessity of obtaining a special permit to fly over certain States. Of such States there are in Europe no less than twelve, and it frequently takes as long as ten days before the authorisation is received, whilst the cost can vary from nothing up to 20s. The present position may be judged from the following instances. A certain capital, 1,100 miles from London, can be reached quicker by express train, which takes forty-two hours, than by an aeroplane, which can do the journey in 10 hours' flying. To get by air to another capital, 925 miles from London, takes from four to five days at the quickest, while another capital, 1,175 miles from London, can only be reached by aeroplane in a fortnight.

The difficulty of obtaining special permits is even greater when the destination is some Extra-European country, as it may involve from a fortnight up to six weeks before the permit is received.

In addition to these special authorisations, the authorities of several countries require to be notified before a British aircraft passes over their territory. Arrangements for undertaking such flights are further complicated by the fact that the day of arrival and departure at every stopping place *en route* must be given when applying for a permit, and any subsequent deviations from the route

are not permissible unless notification has been given to the Governments of the countries concerned.

It is not to be wondered at that both business and pleasure flights have had to be abandoned in the face of these difficulties. It is clear that full advantage cannot be taken of the speed of air travel unless the formality of having to obtain special permits for each flight is abolished and aircraft are accorded treatment similar to that given to surface transport.

Another difficulty is the delay occasioned by the need for pilots to obtain passport visas. It is essential to avoid delay both in the case of the pilot of a regular air line, who may have to move suddenly from one route to another, and also in the case of the commercial pilot engaged in special charter work, who may be required to start at a moment's notice for some foreign country. It is accordingly felt that, in both these cases, the pilot's licence should take the place of the passport with its necessary visas. As the use of such a system must obviously be very restricted, it would be necessary for an approved list of commercial pilots to be drawn up.

Again, the diversity of Customs regulations in various countries also has a restrictive influence on the growth of commercial aviation, and it is considered that every effort should be made to obtain standardised Customs procedure both for aircraft and their contents in all countries.

The Civil Aviation Section has asked the British National Committee of the International Chamber of Commerce to bring its suggestions on these matters to the notice of the Central Organisation in Paris.

### Indian Air Services

A CORRESPONDENT informs us that negotiations are proceeding for the inauguration of a big new air mail service which, it is understood, will have the effect of extending the present England-India route to Singapore, via Calcutta, presumably taking Delhi *en route*. The service may start within the next 12 months. There is also an unofficial scheme on foot for the further development of inland air mail routes in India on ambitious lines, including services from Peshawar in the north, via Lahore, Delhi and Benares to Calcutta, in the east, and from Madras, in the south, along the coast to Calcutta. The proposals are still in the stage of preliminary investigation of their possibilities. The promoters of the scheme have been encouraged by a system worked successfully in Siam, where an air mail service is being run at good profit. Mr. R. B. Jackson, of the Aerial Transport Company, of Siam, designed a special type of letter folder or composite envelope and notepaper which can contain an additional sheet of loose paper and has the postage stamp and the air mail label printed on it. The whole folder is so made as to permit a letter of 1,000 to 1,200 words to be sent for one-sixth of an ounce; there are 96 such letters to every pound weight of mail, as against the 32 letters to the pound which comprise the usual mails carried on the basis of a minimum of half an ounce for each letter. If this composite envelope and notepaper were introduced in the proposed air mail service in India the number of these letters which could be carried in a load would permit of the fee for each being no more than the ordinary postal fee of 5 pice (1½d.), so that if Calcutta would send a letter to Bombay in a single day for the same rate as that charged for the railway mail there would be considerable advantage. The promoters of the scheme contemplate a daily service on each route, with the Bombay-Calcutta and Peshawar-Calcutta service linking up at Benares.

### Commercial Air Services in Russia

SIR PHILIP SASSOON, replying to a question in the House of Commons on November 16 regarding commercial air services in Soviet Russia, said the following services were operated in that country during the present year. (1) Operated by All Union Combine of Civil Aviation:—Moscow-Sverdlovsk-Omsk-Novosibirsk-Irkutsk-Khabarovsk-Vladivostok, with branches as follows—Sverd-

lovsk-Obdorsk; Sverdlovsk-Magnitogorsk; Omsk-Semipalatinsk-Bakhti; Novosibirsk-Stalinsk; Irkutsk-Vitim-Yakutsk-Aldan; Ulan Bator-Irkutsk; Khabarovsk-Okhotsk-Petropavlovsk, with connection to Saghalien Island; Moscow-Kharkov-Odessa; Moscow-Kharkov, Sokhum-Baku; Kharkov-Makhach Kala, Baku-Pahlavi; Moscow-Bodriki Donskoi; Moscow-Stalingrad; Moscow-Samara, Orenburg-Tashkent; Moscow-Leningrad; Tashkent-Bokhara-Krasnovodsk; Tashkent-Stalinabad-Khorog; Tashkent-Samarkand-Termes-Kabul; Tashkent-Alma Ata-Semipalatinsk; Semipalatinsk-Karaganda-Magnitogorsk; Archangel-Ust Zilma-Izama; Archangel-Kotlas-Ust Sysolsk; Archangel-Omega. (2) Operated by the Duruluft (a German-Russian company)—Berlin-Konigsberg-Moscow; Berlin-Konigsberg-Leningrad. No information was available regarding the number of pilots and aircraft employed.

### European Air Transport Statistics

SOME interesting statistics regarding European air transport were given in the House of Commons on November 16 by Sir Philip Sassoon in answer to questions by Mr. Everard and Mr. L. Smith. Regarding the actual payments by way of subsidy to civil aviation in France and Germany, information was not available, but the amounts provided in the Estimates were approximately as follow:—France (1930) 201,000,000 francs, (1931) 217,000,000 francs. Germany (1930) 22,390,000 Reichsmarks, (1931) 22,792,000 Reichsmarks. England (1930) £428,000, (1931) £385,000. The number of pilots employed during 1931 by regular air transport companies of Great Britain, France, Germany, Italy and Holland, and the number of passengers carried are given in the following table:—

Country	Pilots Employed	Passengers Carried	Passengers per Pilot
Great Britain ..	35	23,484	671
France ..	135	32,700	242
Germany ..	160	98,167	614
Italy ..	61	33,650	552
Holland ..	23	11,628	506

# Airport News

## CROYDON

**F**OG has been the predominating element throughout the week, which interfered to some extent with the operating of the air services between Croydon and the Continent, particularly during the latter part of the week. The first hold-up occurred on November 17, when the Imperial Airway's "Argosy" G-AACI, which left Croydon approximately an hour later than the S.A.B.E.N.A. air liner for Brussels, landed at Lympne, where the flight was abandoned. G-AACI was operating a supplementary service, carrying goods only, as the fog on the route was very thick and there were no signs of improvement, the "Argosy" returned to Croydon in the afternoon. The S.A.B.E.N.A. air liner, carrying passengers, reached Brussels safely, completing the journey in 2 hr. 34 min. Two Air Union services were also cancelled in the afternoon.

Weather conditions over the Continental air routes on Friday were worse than the previous day, and nine of the air services were cancelled, which included one Imperial Airways, one D.L.H., three K.L.M., and four Air Union. The only company to operate all its services to schedule was the S.A.B.E.N.A. At Croydon, however, the weather was not too bad for flying, and Surrey Flying Services, Ltd., experienced an unusually busy day for the time of the year. A large party of people arrived at the aerodrome in four motor coaches, each carrying over thirty persons. Nearly all the visitors made a short pleasure flight.

On Saturday the weather conditions became even worse, and all services to and from Croydon were cancelled, with the exception of the S.A.B.E.N.A. 9.30 a.m. to Brussels. The pilot, Capt. Cocquyt (who is the chief pilot of S.A.B.E.N.A.), was convinced that the weather in Brussels would improve. A wireless message received later from Brussels confirmed his convictions, and he left Croydon at 11.54 a.m. with three passengers—a fourth passenger, a young German girl, having decided at the last moment not to go. They reached Brussels by 1 p.m., having covered the distance in 2 hr. 6 min. Those who know Capt. Cocquyt will also know that this was no experiment of good luck, but a fine example of navigation.

It is interesting to note that, although we are nearing the end of 1932, there has not been a single day so far this year that connection with the Continent has not been established.

Although fog and drizzle persisted the whole of the day on Saturday, the inclemency of the weather did not deter a large number of visitors from making a tour of the airport.

A small oval metal disc with the words "Cirrus Hermes" inscribed thereon, is a new gadget which the

Cirrus-Hermes Eng. Co., Ltd., are presenting to private owners using their engines. A space is left in the centre of the disc in which a few words may be displayed, such as "No Smoking" or engine r.p.m., etc.; also a new and distinctive looking specification covering the range of "Cirrus" and "Hermes" engines has just been published.

General Aircraft, Ltd., are at present engaged in the production of fifteen Monospars, and in order to accelerate the rate of production a night shift is permanently employed. During the week I had the pleasure of inspecting the company's workshops, and my time was well spent. To witness a Monospar in the course of production—from a man assembling some small pieces of metal on a jig to the finished machine ready for its tests—is really fascinating. There is a jig for every part, and the simple manner in which everything is assembled reminds one of the ease with which a boy assembles models with a meccano set. The first thing that I noticed upon entering the works was the cleanliness of the place; even the floor was spotlessly clean. The layout of the benches and the systematic way in which everything was done impressed me; I realised that I was in a model aircraft factory. This splendid organisation of the workshops is entirely due to the untiring efforts of Mr. Hartman, the works superintendent, who has arranged everything to a point of perfection.

Already the company are finding that the factory is not large enough to meet their requirements, and there is every likelihood that they will have to extend their premises in the near future. New equipment is also to be installed and will include a stove-enamelling plant in which a whole wing can be stove-enamelled.

The steady growth in the production of aircraft and aero engines at Croydon by General Aircraft, Ltd., and the Cirrus-Hermes Eng. Co., Ltd., respectively is a matter which is adding considerably to the fame of the Empire's greatest airport. Both companies have shown, despite the abnormal and distressing state of commerce generally and particularly during the last twelve months, that not only are they well established, but are also creating a healthy growth, and it is felt that the pendulum of prosperity is swinging in their direction.

The Junior Motorboat Club, with a clubroom at the King's Head, King's Street, Twickenham, has been formed by pupils of Rollason, Muir & Rickard. The club is hoping to acquire a landing ground adjacent to their headquarters at Eel Pie Island, Twickenham. Thus motorboating may be added to the interests of members of the flying school.

The total number of passengers for the week was 928; freight, 46 tons 8 cwt.

HORATIUS.

## FROM HESTON

**T**HE weather on Monday, November 14, was absolutely impossible for flying owing to thick fog.

Tuesday, November 15, gave us a very doubtful morning, but cleared a bit before noon. Mr. Mark Lacayo, of Comper Swift Co., left Heston with the "Pander" PH-AIK belonging to Herr Ten Bos, for Amsterdam.

On Wednesday, November 16, three new pupils joined the School and among the pupils taking instruction were three ladies who, we hope, will shortly join our holders of "A" licences. Lord Willoughby de Broke flew down from Kineton with a friend. By the use of his transmitting and receiving wireless set fitted to his "Puss Moth," Capt. Hope, of Air Taxis, Ltd., flying from Belfast with photos of the visit of H.R.H. the Prince of Wales, was able to talk to Croydon and receive the information that Heston was prepared to put on the lights for a night landing and have a car ready to take the photographer to London. Capt. Hope landed within five minutes of Heston receiving the message and the photographer was off to town with his plates with no delay.

Thursday, November 17, was not a particularly nice day, but Mr. M. Jackaman was off by 10 a.m. in his "Monospar" for the private landing ground of Wing

Com. Weir, near, Ayr, with Mrs. Weir, Miss Balfour and one other as passengers.

Three machines were ready at 9 a.m. on Friday, November 18, to take off—two (School machines) for Cannes and one (Banco) for Berck, but after hearing from Croydon that Imperial Airways had cancelled the services it was thought advisable to cancel the proposed trips. The weather most certainly has a lot to answer for as regards interfering with aviation.

After lunch on Saturday, November 19, two aviators took the air, but were careful to keep low and close to the aerodrome. This led to others copying their example and among them Mr. "Tony" Gibbons showed off the paces of his "Klemm" (Pobjoy).

Sunday, November 20.—Capt. Ferguson took a pupil on a cross-country flight to test his navigational skill, and, although they ran into thick mist, the pupil, fortunately, did the triangular course successfully, as Capt. Ferguson was sitting in the front seat with no compass or map.

Capt. Birkett, of Birkett Air Service, spent a busy week, proceeding from Heston to Belfast on Tuesday; Belfast to Manchester on Wednesday; Manchester to Belfast and back to Manchester on Friday; Manchester to Liverpool on Saturday and Liverpool to Heston on Sunday.



# Airisms from the Four Winds

## Mr. Smith's Flight

MR. VICTOR SMITH, the young South African airman who left Capetown at midnight on November 12-13 to fly to England in a Gipsy II "Moth" (as was reported in FLIGHT last week), reached Gao on the Niger on November 20, and set off again for Croydon. Mr. Smith had been missing since last Monday and much anxiety had been felt for his safety, as it was feared he had force landed in the forests north of Duala. It appears he went down at Dori, an isolated spot 150 miles south-west of Gao. Exchange states that Mr. Gordon Store was just setting off in Mrs. Mollison's "Puss Moth" to search for the missing airman when news came through of the latter's safety.

## World Flight Disaster

THE world flight of Mr. Arthur Loew (full particulars of which were given in FLIGHT of October 13) came to an unfortunate end at Victoria Falls on November 18. It appears that the pilot, Capt. James Dickson, landed at the Victoria Falls aerodrome, mistaking it for the Livingstone aerodrome, nine miles distant. While trying to take off again the wheels of the Lockheed "Orion" monoplane sunk into the soft sand of the aerodrome, causing the machine to turn over and crash into a tree. Mr. Dickson was killed and his two passengers, Mr. Loew and his secretary, injured.

## Italian Planes to Fly Atlantic

PLANS for the Italian Formation flight have been altered somewhat. The 20 Savoia-Marchetti seaplanes are to attempt a crossing of the Atlantic from Rome to New York, then on to Chicago and back again to Rome. Italian warships are to be stationed in the Atlantic which will keep in wireless communications with the machines. The seaplanes are similar to those which made the Southern Atlantic crossing to Brazil, though they have been modified and strengthened to withstand Atlantic storms. It is to be hoped that General Balbo will lead the squadron.

## United States Control over Big Flights

AT last a nation has been sensible enough to put a check on senseless flights which prove nothing and only result in unnecessary risk of good lives and valuable material. The United States Government has decreed that in future all projected transoceanic flights will require the preliminary approval of the Department of Commerce. Permission for such a flight will only be given after the Department of Commerce is fully satisfied that the pilot is qualified to make the flight and his equipment adequate, also that permission to land has been obtained from the country to which the flight is intended.

## Artificial Fog

AN interesting experiment in aerial defence was carried out over Paris lately. On the alarm being given that enemy aeroplanes were approaching the city, dense columns of smoke were shot into the air, with the result that in four minutes the whole place was covered by an impenetrable mist. This protective fog covered an area of about one square mile and was so dense that the attacking airmen were unable to spot their targets.

## German Thanks to Lifeboat Inst.

THE German Ambassador has forwarded the thanks of his Government to the Royal National Lifeboat Institution for the gallant efforts made, in very difficult circumstances, to rescue a German aeroplane which was lost in the Channel on October 29. News was received at Dover just before 10 at night that an aeroplane was down in the Channel; in spite of the fact that a gale was blowing, two lifeboats put out to sea immediately. One searched for four hours, and the other did not return home until 7.30 the following morning; unfortunately, nothing was found.

## Sea and Air Port for Galway

PREPARATIONS are being made for the establishment of a new sea and air port at Furbough, Galway Bay, on the West Coast of Ireland. Such a new Atlantic terminal port, with a service of 30-knot liners across to Halifax, Nova Scotia, would bring New York a day and a-half nearer to London. The scheme has the approval of the

British, Irish Free State, and Canadian Governments. Various technical and financial details are being prepared by Mr. Maxwell Ayrton, F.R.I.B.A., a famous firm of civilian engineers, one of the best-known London firms of chartered accountants, and Sir Alan Cobham.

## Prime Minister of Iraq flies to Geneva

GENERAL NURI PASHA ES SAID, the former Prime Minister of Iraq, left Baghdad by air for Geneva on a special mission. General Nuri Pasha first flew in a Handley-Page when fighting with Col. Lawrence in Trans-jordan against the Turks, and has been an ardent believer in aerial transport ever since.

## The New D.H. Machine

THE new De Havilland production (first mentioned in FLIGHT of September 16), which is to be designated the D.H.84, is now nearing completion, and should be ready for test shortly. It is a biplane of wooden construction, powered by two inverted "Gipsy Major" engines. The mounting of these engines is of particular interest. They are mounted on each lower wing, but instead of being built into the wings or rested on them, each engine is mounted forward of the leading edge, in which position it is not only extremely accessible for inspections and repairs, but the maximum amount of natural cooling will also be obtained. Another interesting feature is the placing of the petrol tanks, which are mounted on the wings behind the engines and so carry off the streamlining of that part of the engine which is above the level of the plane. Two types are being constructed, one for civilian use, which possesses a cabin with ample accommodation for six passengers, and a large compartment for luggage; several of these have been ordered by Hillman's Airways. The second type is for military purposes, several being destined for Iraq. The pilot's cockpit is forward of the main cabin, and the view from it is good. The machine will have an estimated cruising speed of about 110 m.p.h., which, considering the load carried by the two "Gipsy Major's," is very creditable. All the controls are internal, and under the fuselage are inspection holes large enough to admit the head of a normal man.

## Royal Aero Club House Dinner

THE Royal Aero Club will hold a house dinner on November 30, at 8 p.m., at which Lord Gorell will preside and Mr. R. D. Blumenfeld will speak on "The Press and Aviation." The price of the dinner will be 5s. (lounge suits), and members wishing to attend are requested to forward their names to the House Secretary together with remittance for 5s.

## Town Planning by Air

IN the November issue of *The Parthenon* Mr. H. Hemming writes a very interesting article illustrating the value of aerial photography; as he points out, the aerial camera has revolutionised the present methods of ground survey without in any way destroying them, for aerial survey needs the close co-operation of a ground staff. Two aerial surveys which have been done lately illustrate, better than any written article, the value of the aerial camera. In Northern Rhodesia 62,000 sq. miles were surveyed in 18 months at a cost of £1 per sq. mile—a daily average of 690 sq. miles; the actual photography was completed in three months. A survey of Rio de Janeiro, the beautiful capital of Brazil, was completed in three and a-half years and would have taken ten to twelve years without the aid of aerial photography, by which time three-quarters of the work would have been out of date. The result of this survey was that extensive improvements were carried out which much increased the city's beauty, and excellent maps were produced that were a model of accuracy. The Aircraft Operating Co. did the work on British machines though employing much Brazilian labour, and the actual flying was done at heights between 5,000 and 12,500 ft.

## New French Air Attaché

LT. DE VAISSEAU V. ALBERTAS will take up the duties of Air Attaché at the French Embassy, from Lt. de Vaisseau P. A. Sala, as from December 1.

# The Industry

## SELF STARTING

NOBODY will regret the day when self-starting the engine from the cockpit is a feature in every type of aircraft. It is an inevitable development, and when completely in vogue it will considerably add to the comfort of flying. "Swinging the airscrew" has always looked a formidable operation, even when expertly handled, and although, fortunately, we now hear of few mishaps resulting from it, it remains a dangerous feature of aviation when the ground is muddy. It especially looks obsolete with a modern luxurious touring aeroplane. Every consideration now directed towards the problem of self-starting is therefore welcome. A leaflet has been issued by the Automotive Products Company describing their Heywood High-Pressure Injection Starter, which is manufactured at their Leamington works. This unit comprises a single-cylinder two-stage air-cooled compressor, driven from any convenient point of the engine, with a compound distributor as an integral part. There is also a small air receiver or bottle, provided with an automatic non-return valve, which enables pressures up to 400 lb. per sq. in. to be conveniently carried.

Completely installed, the weight of the unit is approximately 30 lb., and is suitable for any number of cylinders.

In operation, a valve is opened by means of a starter push-button or a similar means of control, and compressed air from a small storage tank flows into the distributor on the front of the starter, which is timed and rotates with the engine. Part of the compressed air enters the cylinder or cylinders, which are on the explosion stroke, and forces the piston down. Simultaneously a lesser amount of compressed air is released and passes through a carburation process, being mixed with petrol. The resultant mixture is distributed into each cylinder as it reaches compression stroke in cyclic order. As the stroke is completed instant ignition follows, and the explosion forces the piston downwards, accelerating engine rotation and causing sufficient vacuum in the induction manifold for continued carburation in the normal manner. The company's address is Brock House, Langham Street, W.1 (Tele.: Langham 1373).

## MICRO-RAY FOR CHANNEL AIR SERVICES

A "MICRO-RAY" equipment giving radio communication on the shortest wavelength employed at any radio station in the world, has been ordered by the Air Ministry for use in connection with cross-Channel flying services. This equipment will be manufactured by Standard Telephone & Cables, Ltd. Eighteen months ago the first demonstration of practical radio telephony on a wavelength below one metre was given by the International Telephone and Telegraph Laboratories of Hendon, working in co-operation with the Laboratories of Le Matériel Téléphonique, Paris. On

that occasion radio telephonic communication was established between Dover and Calais on a wavelength of approximately 18 centimetres. The equipment now ordered will operate on an even lower wavelength—in the neighbourhood of 15 centimetres. For communication on this minute wavelength, transmitting and receiving aërials less than 1 in. long are used. Micro-Rays oscillating at a rate of about 2,000,000,000 times a second are generated in a special "Micro Radion" tube. These oscillations are led to the tiny transmitting aerial and are then concentrated by a combination of mirrors into a fine pencil of rays, which are thrown into space from a circular reflector, about 10 ft. in diameter. This reflector is focussed on to a similar reflector at the receiving station. The equipment ordered by the Air Ministry will be located at Lympne Airport, near Hythe, and will operate in conjunction with a similar equipment ordered by the French Air Ministry to be situated at St. Inglevert aerodrome, nearly seven miles south-west of Calais. It will be used for announcing the arrival and departure of aeroplanes that are not fitted with radio, and for routine service messages. An extremely interesting feature of this new service will be the use of teleprinters for both receiving and transmitting messages. In this way typewritten messages will actually be sent across the Channel by radio, thus providing a permanent record at each end. The use of teleprinters will also help to overcome the language difficulty, since it is easier for a man to understand a written message in a language with which he is unfamiliar than a spoken one. Messages can also be received on a teleprinter during the temporary absence of the operator. A great advantage of the use of Micro-Rays is the fact that they are almost entirely unaffected by atmospheric conditions. Another advantage is that on this extremely low wave band there is practically no interference from congestion of the ether or from nearby machinery. It is expected that the station will be in operation early next spring, and its use will relieve the volume of traffic at Croydon and Lympne wireless stations very considerably. The Air Ministries of both countries are to be congratulated on their enterprise in adopting this revolutionary means of communication, which will undoubtedly still further increase the efficiency of the cross-Channel flying services.

## ADCOL OIL TEST

INTERESTING results on the running of the Napier E.97 inverted six-cylinder-in-line of 150 h.p. engine on Duckham's Adcol N.P.5 Aero Engine Oil is contained in a report from D. Napier & Son, Ltd., and issued by Alexander Duckham & Co., Ltd. Airwork, Limited, fitted the Napier into a Spartan fuselage, which acted as the flying test-bed, and the report mentioned runs as follows: "Total time run on test in the air was 228 hr.

25 min., and on the ground 17 hr. The aircraft was equipped with special instruments and during the test nearly 20,000 readings were written down by the pilots on a special tape paper. Many of these were particularly to note the state of the lubricating oil under various conditions.

"The machine was flown at altitudes to nearly 20,000 ft., and in temperatures down to 25 deg. below zero C. Four hundred and fifty take-offs and landings were made, and the engine did approximately 27,600,000 revolutions. It was also climbed at full throttle, and the lowest possible air speed for long periods in order to induce overheating, if such a condition were possible.

"All these factors provided a very stringent test for the lubricating oil, which was only changed twice during the test. The oil filters also were only cleaned twice. Upon stripping, the engine was found to be in excellent condition. Bearings and pistons showed practically no measurable wear, and sludge was practically non-existent."

Incidentally, in the November issue of *Links*, the house journal of Alexander Duckham & Co., Ltd., there is an interesting article on the history of the D.H. "Gipsy" engine, sketching in the improvements in design and outstanding performances of each successive type. A notable coincidence in this history is that both the "Gipsy I" and the "Gipsy Major" glorified their public appearances by winning a King's Cup Race, testifying to the merits of both the vertical and inverted types.

## FOREIGN AGENTS

THE most hopeful sign about the future of our aircraft industry is its initiative in the world's markets. The common taunt against the general lethargic attitude of British industry to its foreign interests is certainly not justified in the case of the aircraft section. Most of the aircraft firms are now ably represented in all the potential markets abroad. One of the most important of these markets is Japan, and here our industry is gaining a firm footing. *FLIGHT* is constantly receiving notification of the appointment of agents for our aircraft industry in that country, and is always pleased to record the news. Our latest item of this nature is that the Japanese agents for Lodge Plugs, Ltd., are Mikuni Shoten, Inc., No. 3, Gokencho, Kanda, Japan.

## THE "BRISTOL REVIEW"

WE have received engine issue No. 5 of the *Bristol Review*, published by the Bristol Aeroplane Co., Ltd. It is one of the best produced house organs that we are favoured with. Well printed and neatly illustrated, the present issue contains an excellent article on the new world height record of 43,976 ft., set up by Flt. Lt. C. F. Uwins on the "Vespa" ("Pegasus"), a sound article on supercharging and another on the testing of supercharged engines. There are some interesting details about the "Pegasus" Pusher engine, and among the illustrations of special value is that of the 1933 model of the Bristol "Bulldog" fitted with the "Mercury I.V.s.2" engine.



# THE ROYAL AIR FORCE

London Gazette, November 15, 1932

## General Duties Branch

The follg. Pilot Officers are promoted to rank of Flying Officer:—J. N. Jefferson (March 26); J. L. Armstrong, R. V. Bucknall, R. J. Twanley (Oct. 13). Flight Lieut. W. D. Gairdner, D.F.C., is restored to full pay from half-pay (Nov. 3); Lt.-Cdr. A. P. Colthurst, R.N., Flight Lieut. R.A.F. ceases to be attached to R.A.F. with effect from Sept. 26, on return to Naval duty, and is reattached to R.A.F. as a Flight Lieut., with effect from Nov. 1, and with seny. of July 1, 1929. Sqdn.-Ldr. W. D. Long, O.B.E., is placed on retired list at his own request (Nov. 1).

## Medical Branch

The follg. are granted short service commns. as Flying Officers for three years on the active list with effect from Oct. 31, and with seny. of the dates stated:—E. Donovan, M.B., Ch.B.; J. F. Sandow, M.R.C.S., L.R.C.P. (Oct. 31, 1931); T. D. L. Bolan, L.R.C.P., and S.; R. E. W. Fisher, M.B., B.Ch. (Oct. 31).

## Dental Branch

C. R. Stone, L.D.S., is granted a non-permanent commn. as a Flying Officer with effect from and with seny. of Oct. 31; the non-permanent commn. of F/O. V. H. Weeks, L.D.S., is ante-dated to April 5; Flight Lieut. A. R. H. Bennett, L.D.S., relinquishes his temp. commn. on completion of duty Oct. 28).

## ROYAL AIR FORCE INTELLIGENCE

**Appointments.**—The following appointments in the Royal Air Force are notified:—

### General Duties Branch

Wing Commander F. W. Stent, M.C., to H.Q., Wessex Bombing Area, Andover, 1.11.32, for Engineer Staff duties vice S/Ldr. E. J. D. Townesend.

Flight Lieutenants: A. V. Hammond to No. 2 (A.C.) Sqdn. Manston, 7.11.32. M. J. Du Cray, to No. 26 (A.C.) Sqdn., Catterick, 4.11.32.

Flying Officers: A. D. Jaffe to R.A.F. Base, Gosport, 9.11.32. R. C. Gaskell, to No. 465 (F. T. B.) Flight, 9.11.32. H. A. V. Hogan, to No. 404 (F.F.) Flight, 9.11.32.

Pilot Officers: The following Pilot Officers were posted to No. 3 Flying Training School, Grantham, on 10.10.32, for Flying training on appointment to permanent commissions:—J. G. Bigelow, R. Faville, S. F. Golden, S. E. MacKenzie, R. G. S. Morgan-Smith, N. H. J. Tindal and E. G. Villiers.

## Legal Branch

Wing Commander D. L. Ingpen is placed on half-pay list on account of ill-health (Nov. 16).

## ROYAL AIR FORCE RESERVE. RESERVE OF AIR FORCE OFFICERS

### General Duties Branch

Pilot Officer on probation J. T. Percy is confirmed in rank (Sept. 12); Pilot Officer J. A. Slater is promoted to rank of Flying Officer (Oct. 7); Pilot Officer W. T. Taylor is transferred from Class C to Class AA (ii) (Oct. 7). The follg. Flight Lieuts. relinquish their commns. on completion of service:—D. E. Ward (Oct. 24); P. Stainer (Nov. 10).

The follg. Flying Officers relinquish their commns. on completion of service:—V. A. C. Ross (Nov. 10); H. A. M. Weir (Nov. 15); Flying Officer J. G. Goodyear relinquishes his commn. on completion of service and is permitted to retain his rank (Oct. 28).

## AUXILIARY AIR FORCE

### General Duties Branch

No. 602 (CITY OF GLASGOW) (BOMBER) SQUADRON.—The attachment to Regular Air Force of Flight Lieut. D. F. McIntyre is extended for period April 20 to Oct. 31.

### Stores Branch

Squadron Leader: H. E. Tansley, M.C. to Station H.Q., Manston, 1.11.32, for Stores duties.

### Medical Branch

Wing Commander H. A. Hewat to R.A.F. General Hospital, Hinaidi, 30.10.32, for duty as Commanding Officer vice W/Cdr. K. Biggs.

Flight Lieutenant N. I. Smith, to Station H.Q., Boscombe Down, 12.11.32.

## NAVAL APPOINTMENTS

The following appointments have been made by the Admiralty:—

### ROYAL AIR FORCE

Flying Offrs.—A. D. Jaffe, to R.A.F. Base, Gosport; R. C. Gaskell, to *Furious*, for 465 Flight; and H. A. V. Hogan, to *Courageous*, for 404 Flight (Nov. 9).

## MRS. MOLLISON'S FINE FLIGHT

(Concluded from page 1133)

Needless to say, Mrs. Mollison has received numerous messages of congratulation, amongst which were the following:—From H.M. the King: "Please convey to Mrs. Mollison hearty congratulations on her splendid achievement. I trust that she is not too exhausted.—George, R.I."

From Lord Londonderry, Secretary of State for Air: "On behalf of the Air Council I congratulate you most warmly on the successful completion of your magnificent flight."

Messages were also sent by the Royal Aero Club and the Royal Aeronautical Society, Lord Wakefield, etc.

Mr. A. E. Whitelaw, the Australian philanthropist—who gave Mr. Mollison £1,000 in recognition of his Australia flight—is presenting a cheque for £1,000 to Mrs. Mollison in recognition of her achievement.

It was reported that Mr. and Mrs. Mollison might fly home together next month, and endeavour to set up yet a new record in so doing. Mr. Mollison, however, later decided not to make the flight. It is possible that Mrs. Mollison may attempt the flight back alone, and establish a new Cape-England record.

All honour having been paid to "Amy," it is only fitting to mention some of the mechanical contributions towards her success. The D.H. engine and machine have, of course, already been mentioned. Shell Aviation petrol was used, as on previous flights by both Mr. and Mrs. Mollison, while the lubricating oil was Castrol. The "Gipsy Major's" first successful long-distance flight was assisted by K.L.G. plugs and B.T.H. magnetos. Smith's instruments made desert landmarks, daylight, etc., unnecessary. Finally, the Civil Air Ensign on either side of the *Desert Cloud's* tail were transfers supplied by the London & Provincial Aviation Co.

## Bristol Airport

WORK has already started on the new road leading from the city to the airport, referred to in our last issue, and it is expected that the road will be completed in the early spring. Improvement of the approaches to the airport should result in increased business next summer for all concerned, and particularly to the joyriding and air-taxi organisations at Bristol. The Bristol-Cardiff ferry is still operated with the utmost regularity, and, considering the time of the year and recent weather conditions, the patronage of this service has been satisfactory. It has been decided to continue a twice-daily service, in each direction, throughout the winter.

## A Reception

At the Marchioness of Londonderry's reception to meet the Prime Minister, held on the afternoon of November 21 at Londonderry House, Park Lane, the following were amongst the many guests who accepted invitations to be present:—The Duke and Duchess of Sutherland, Lord and Lady Wakefield, Mr. A. C. Bossom, Lt. Col. J. T. C. Moore-Brabazon, Mr. and Mrs. A. E. Chorlton, Capt. the

Hon. F. E. Guest, Sir Samuel and Lady Maud Hoare, Mr. and Mrs. H. R. Murray-Philipson, Sir Philip Sassoon, Air Vice-Marshal and Mrs. Burnett, Air Vice-Marshal Dowding and Miss Dowding, Air Marshal Sir E. Ellington, Wing Com. Sir Louis and Lady Greig, Sir Samuel and Lady Instone, Air Marshal Sir Geoffrey and Lady Salmond, Sir John and the Hon. Lady Salmond, Col. the Master of Sempill and the Hon. Mrs. Forbes Sempill, Sir Christopher and Lady Bullock, Lt. Col. and Mrs. F. C. Shelmerdine, Rear Admiral and Mrs. M. F. Sueter and Miss Sueter, Sqd. Ldr. and Mrs. J. Whitford, etc.

## Neon Lights at Croydon

AIR MINISTRY Notice to Airmen, Series A, No. 69, of the year 1932, notifies that Neon ground lights have been installed at Croydon Aerodrome. These lights are below the surface of the ground and appear from the air as an interrupted line 300 yd. in length, situated west of the landing circle. For the present these lights will be only operated when visibility is bad, or by night on special request to the Chief Aerodrome Officer.

AIRCRAFT COMPANIES' STOCKS AND SHARES

DURING the past month the stock and share markets have shown an irregular tendency, largely owing to uncertainties regarding the attitude of the United States on the war debts question and the news that the World Economic Conference may not be held until April. The market view is that the rather lower prices of industrial shares are due to selling by holders of the new Conversion loan who received a larger allotment than had been anticipated and have had to accumulate resources to meet the next big instalment due on December 1. As was to be expected, shares of aircraft and allied companies reflected the general market tendency and the possibility of international disarmament being effected partly by "cuts" in military aircraft. On balance for the month Fairey Aviation have gone back from 17s. to 14s. 6d. This is due in part to uncertainty regarding a reduction in the dividend, but it is argued in some quarters that there would have to be a large fall in profits to necessitate a reduction, because in respect of the previous year as much as nearly 23 per cent. was earned on the shares, as against the dividend of 10 per cent. net paid. De Havilland, which are 16s. 3d. against 17s. 3d. a month ago, are also under dividend considerations. For the previous year the dividend was 5 per cent., but as £10,000 was used to write down investments in subsidiaries and provide for any loss on exchange, the dividend was not quite fully earned and necessitated a reduction in the sum carried forward from £7,894 to £5,624. Imperial Airways held up very well throughout the month and are 21s. at the time of writing. The yield on the shares is small on the basis of the past year's dividend of 3 per cent., but the tendency has always been for the price to discount prospects a good way ahead. The market view is that the lower external value of sterling should continue to be a very favourable factor for the company in competing for foreign

Name	Class	Nominal Amount of Share	Last Annual Dividend	Current Week's Quotation
Anglo-American Oil	Deb.	Stk.	5½	102
Armstrong-Siddeley Develop.	Cum. Pref.	£1	6½	18/1½
Birmingham Aluminium Castg.	Ord.	£1	5	17/6
Booth (James), 1915	Ord.	£1	15	48/6
Do. do.	Cum. Pref.	£1	7	26/3
British Aluminium	Ord.	£1	5	25/-
Do. do.	Cum. Pref.	£1	6	21/3
British Celanese	Ord.	10/-	Nil	8/9
British Oxygen	Ord.	£1	3	23/10½
Do. do.	Cum. Pref.	£1	6½	25/-
British Piston Ring	Ord.	£1	12½	27/6
British Thomson-Houston	Cum. Pref.	£1	7	27/6
Brown Brothers	Ord.	£1	10	31/3
Do. do.	Cum. Pref.	£1	7½	26/3
Dick (W. B.)	Cum. Pref.	£10	5	125/-
De Havilland Aircraft	Ord.	£1	5	16/3
Dunlop Rubber	Ord.	c	Nil	19/1½
Do. do.	"C" Cum. Pref.	16/-	10	21/3
En-Tout-Cas (Syston)	Def.Ord.	1/-	Nil	-/6
Do. do.	Ptg. Pfd. Ord.	5/-	8	2/6
Fairey Aviation	Ord.	10/-	10*	14/6
Do. do.	1st. Mt. Deb.	Stk.	8	111
Firth (T.) & John Brown	Cum. Pref.	£1	6d	4/6
Do. do.	Cum. Pref.	£1	5*d	3/6
Ford Motor (England)	Ord.	£1	Nil.	22/9
Fox (Samuel)	Mt. Ptual.	Stk.	5	82½
Goodyear Tyre and Rubber	Deb.	Stk.	6½	104
Handley Page	Ptg. Pref.	8/-	10B	8/9
Hoffmann Manufacturing	Ord.	£1	Nil.	15/3
Do. do.	Cum. Pref.	£1	7½	20/-
Imperial Airways	Ord.	£1	3	21/-
Kayser, Ellison	Ord.	£5	Nil.	55/-
Do. do.	Cum. Pref.	£5	6	72/6
Lucas (Joseph)	Ord.	£1	20	77/6
Napier (D.), & Son	Ord.	5/-	Nil.	3/6
Do. do.	Cum. Pref.	£1	7½	18/9
Do. do.	Pref.	£1	8A	15/7½
National Flying Services	Ord.	2/-	Nil.	-/4½
Petters	Ord.	£1	Nil	15/-
Do. do.	Cum. Pref.	£1	7½	13/9
Roe (A. V.), (Cont. by Arm- strong Siddeley Devel., q.v.)	Ord.	£1	—	—
Rolls-Royce	Ord.	£1	10	43/3
Smith (S.) & Sons (M.A.)	Def. Ord.	1/-	Nil	2/3
Do. do.	Pt. Ptd. Ord.	£1	7	21/10½
Do. do.	Cum. Pref.	£1	7½	20/7½
Serck Radiators	Ord.	£1	12½	30/6
"Shell Transport & Trading"	Ord.	£1	7½*	48/1½
Do. do.	Cum. Pref.	£10	5	£11½
Triplex Safety Glass	Ord.	£1	10	40/-
Vickers	Ord.	6/8	5	6/9
Do. do.	Cum. Pref.	£1	5*	19/1½
Vickers Aviation (Cont. by Vickers, q.v.)	—	—	—	—
Westland Aircraft (Branch of Petters, q.v.)	—	—	—	—

\* Dividend paid, tax free. c £1 unit of stock. d Last xd. March, 1931.  
A Last xd. September, 1931. B Last xd. July, 1932.

business. D. Napier issues have been rather neglected, but the 8 per cent. preference show an improvement on the month from 12s. 6d. to 15s. 7½d. The 7½ per cent. preference have gone back from 20s. to 18s. 9d., but are firm; their next half-yearly dividend falls to be paid at the end of next month. In other directions, Rolls-Royce have reflected the general market tendency with a decline on balance from 45s. to 43s. 3d. Handley-Page preference are 8s. 9d., compared with 9s. 4½d. a month ago; the quotation has not been tested by much business. In other directions, Dunlop Rubber have been active on the latest developments affecting the company, and on balance show a rise from 17s. 10½d. to 19s. 1½d. S. Smith (M.A.) issues again moved in favour of holders, the increased profits shown by the report being a helpful factor, as was the payment of the preferred ordinary dividend in full.

Civil Air Ensign

A TRANSFER of the Civil Air Ensign, 12 in. by 6 in. in size, is produced by the London & Provincial Aviation Co., Thackeray Street, W.8, for those who like to have the ensign on their machines. As an improved means of mounting it this transfer has been devised, being applied on the selected surface, and finished off with varnish. Prices are 6s. for two and 3s. 6d. each.

PUBLICATIONS RECEIVED

Technical Notes of the U.S. National Advisory Committee for Aeronautics No. 417. Wind-Tunnel Tests of a Hall High-Lift Wing. By F. E. Weick and R. Saunders. May, 1932. No. 419. Wind-Tunnel Tests on the Fowler Variable-Area Wing. By F. E. Weick and R. C. Platt. May, 1932. No. 420. Effect of Propellers and Nacelles on the Landing Speeds of Tractor Monoplanes. By R. Windler. May, 1932. No. 421. Nature of Air Flow About the Tail of an Airplane in a Spin. By N. F. Scudder and M. P. Miller. May, 1932. No. 423. Effect of Length of Handley Page Tip Slots on the Lateral-Stability Factor, Damping in Roll. By F. E. Weick and C. J. Wenzinger. July, 1932. No. 424. Preliminary Photomicrographic Studies of Fuel Sprays. By D. W. Lee and R. C. Spencer. July, 1932. No. 425. Methods of Visually Determining the Air Flow Around Airplanes. By M. N. Gough and E. Johnson. July, 1932. No. 426. Comparative Performance of a Powerplus Vane-Type Supercharger and an N.A.A.C. Roots-Type Supercharger. By O. W. Schey and H. H. E. Ellerbrock, jr. July, 1932. No. 427. Strength Tests on Thin-Walled Duralumin Cylinders in Torsion. By E. E. Lundquist. August, 1932. No. 428. Characteristics of an Airfoil as Affected by Fabric Sag. By K. E. Ward. August, 1932. No. 429. Heat Dissipation from a Finned Cylinder at Different Fin-plane Air Stream Angles. By O. W. Schey and A. E. Biermann. August, 1932. No. 430. Effect of Engine Operating Conditions on the Vaporisation of Safety Fuels. By A. M. Rothrock and C. D. Waldron. August, 1932. No. 431. Tests on Thrust Augmentors for Jet Propulsion. By E. N. Jacobs and J. M. Shoemaker. September, 1932. Errata for No. 408. General Formulas and Charts for the Calculation of Airplane Performance. U.S. National Advisory Committee for Aeronautics, Washington, D.C., U.S.A.  
Our Mothers. By A. Bott and I. Clephane. London: Victor Gollancz, Ltd. Price 8s. 6d. net.  
Jahrbuch 1932 der Deutschen Versuchsanstalt für Luftfahrt, E. V. Edited by Dr.-Ing. W. Hoff. R. Oldenbourg, Glückstrasse 8, Munich, Germany. Price M. 35.  
The Book of the Standard Nine. By John Speedwell. London: Sir Isaac Pitman and Sons, Ltd. Price 2s. 6d. net.  
Night Flight. By Antoine de Saint-Exupery. Translated by Stuart Gilbert. London: Desmond Harmsworth, Ltd. Price 6s.  
The Air Pilot (Vol. 1) Monthly Supplement. No. 38. November, 1932. London: H.M. Stationery Office, W.C.2. Price 6d. net.  
Amendment List No. 28 to Air Publication 1208. October, 1932. Airworthiness Handbook for Civil Aircraft. London: H.M. Stationery Office, W.C.2. Price 2d. net.

NEW COMPANY

CIRCLE TRAVEL AND TOURS, LIMITED, 10, Lower John Street, Golden Square, W.1. Capital, £100 in £1 shares. Objects, to promote and arrange tours by land, sea or air in Great Britain and abroad. Directors:—Lt.-Col. H. A. Moor, "Beechwood," Cuckham Dene, Berks. E. V. Allen, "Tudor Baron," Cuckham Dene, Berks, insurance agent.

AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motors. (The numbers in brackets are those under which the Specification will be printed and abridged, etc.)

APPLIED FOR IN 1931  
Published November 24, 1932

- 20,718. PIONEER INSTRUMENT CO., INC. Position-indicating instrument for aircraft. (382,625.)
- 21,287. H. L. MILNER. Method of attaching propeller blade to hub. (382,632.)
- 23,537. ECLIPSE AVIATION CORPORATION. Combined engine starter and compressor. (382,688.)
- 24,399. A. T. S. CO., LTD., H. N. WYLIE and S. SANDERS. Corrugated aircraft members. (382,700.)
- 27,210. ARMSTRONG SIDDELEY MOTORS, LTD., and H. CANTRILL. Piston for fluid-pressure engines. (382,721.)
- 27,211. ARMSTRONG SIDDELEY MOTORS, LTD., and H. CANTRILL. Pistons for fluid-pressure engines. (382,722.)
- 27,427. A. and F. S. SHORT. Mooring buoys. (382,726.)